FEBRUARY 27, 1956

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

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✔ Oil Well Tubing Market Grows —page 167

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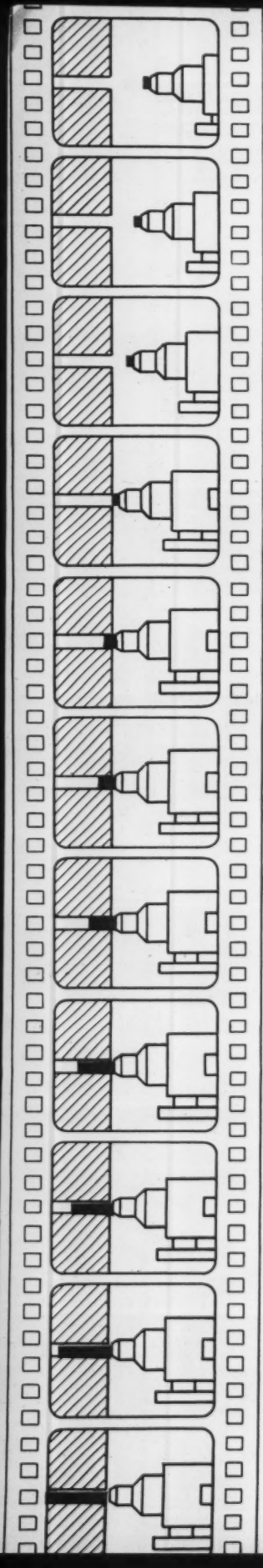
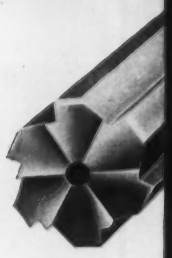


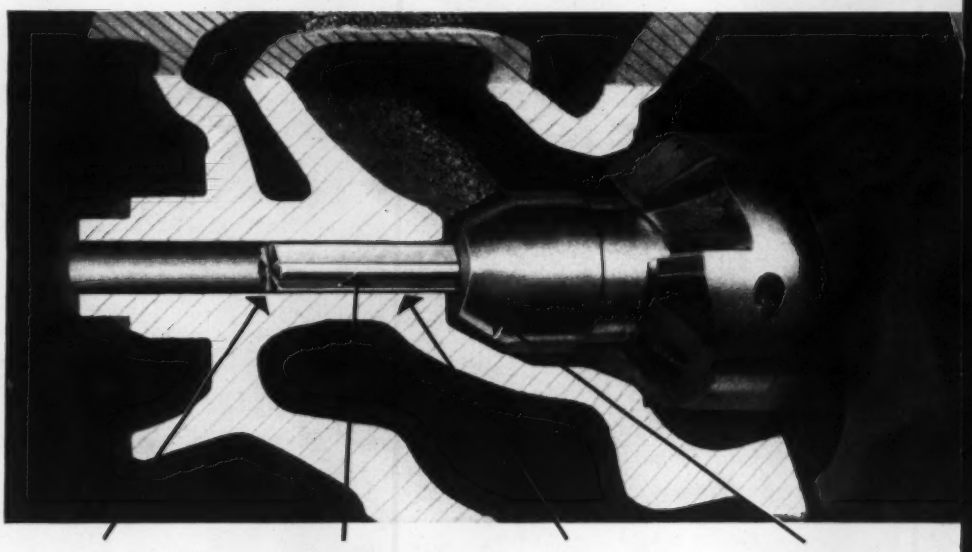
New Heald Method of

BORE REAMING



keeps small-hole finishing

on the STRAIGHT AND NARROW



CUTTING ACTION takes place here, at BORE REAMER end face.

FLUTED EDGES support BORE REAMER and provide chip clearance.

BORE REAMER, of solid tungsten carbide, feeds out into hole.

SUPPORT BUSHING rotates with the BORE REAMER.

IT'S NOT *boring*, not *reaming*—but a unique combination that gives you the desirable features of *both*. For long, small-diameter holes, BORE REAMING provides a high degree of accuracy and precision economically.

The BORE REAMING tool, or BORE REAMER, is firmly supported by a rotating bushing, immediately next to the face of the work, and is fed outward into the hole by a mechanical or hydraulic feed-out mechanism. Cutting action takes place only at the outer end edge of the BORE REAMER *face*. It penetrates as straight and true as a single-point boring tool, without a conventional reamer's tendency to follow irregularities in the drilled hole. Since the support bushing rotates with the BORE REAMER, the only wear is from the slow in-and-out movement of the tooling.

Finish size of any hole is determined solely by the BORE REAMER diameter—hence a change in hole size is simply a matter of changing the BORE REAMER, with no need for delicate tool adjustments.

If you do work that falls into the BORE REAMING class, this is something you should look into. Your Heald representative will be glad to give you the complete story. Remember, IT PAYS TO COME TO HEALD.

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

HEALD®

It's a pleasure to work with a fine hand tool

Today more and more newcomers to the do-it-yourself ranks are coming to realize what professional craftsmen have always known—that there's nothing so satisfying in use as a quality hand tool.

A favorite tool of professionals and amateurs alike is this No. 923 10-in. bit brace, a product of Stanley Tools, of New Britain, Conn. The bow, the ball-bearing head, the box ratchet, the heavy-duty shell and the self-centering chuck are all made of cold-drawn carbon-steel bars.

While we do not produce cold-drawn carbon bars, Bethlehem supplies hot-rolled bars to independent cold-drawers who serve Stanley Tools. Cold-drawing gives hot-rolled steel a brighter finish, closer dimensional accuracy, improved machinability and greater strength. Result: a handsome, rugged, smooth-working hand tool.

If you are looking for bars that will give you an extra-strong and durable, extra-good-looking product, we recommend your independent supplier of cold-drawn bars. He'll serve you well!

. . . . . .

If you find the supply of carbon bars a bit tight just now, we ask your forbearance. We're doing our best to meet the unprecedented demand, all the while maintaining our customary quality standards.

. . . . . .

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

another revolutionary development by La Salle

THE NEW fatigue-proof STEEL BAR

gives HIGH STRENGTH... WITHOUT HEAT TREATING

"FATIGUE-PROOF" steel bars offer high strength in-the-bar . . *without the expense and trouble of heat treating.* Tensile strength is in the 140,000 to 150,000 p.s.i. range . . hardness, which is related to this strength level, is approximately 30 Rockwell "C."

"FATIGUE-PROOF" has uniform strength across the bar . . and this uniformity is maintained from bar to bar . . lot to lot. This remarkable uniformity of strength makes "FATIGUE-PROOF" ideal for applications in the 140,000 to 150,000 p.s.i. range that formerly required heat treated carbon and alloy steels, either hot rolled or cold drawn.

yet it's EASY TO MACHINE

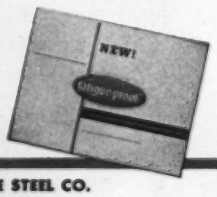
"FATIGUE-PROOF" machines at least 25% faster than annealed alloys . . 50% to 100% faster than heat treated alloys.

"FATIGUE-PROOF's" excellent machinability permits faster speeds, heavier feeds, better tool life . . your production rates will increase.

Distortion from machining is held to a minimum . . surface finish is greatly improved.

Our Sales Engineers will be happy to show you how you can cut costs and eliminate problems and provide samples for test purposes.

JUST PUBLISHED! Ask for your copy of this new 20-page booklet which gives additional information on the remarkable new "FATIGUE-PROOF."



La Salle STEEL CO.

1414 150th STREET • HAMMOND, INDIANA

Manufacturers of America's Most Complete Line of Quality Cold-Finished Steel Bars

LA SALLE STEEL CO.
1414 150th Street
Hammond, Indiana

Please send me your "FATIGUE-PROOF" Bulletin.

Name_____

Title_____

Company_____

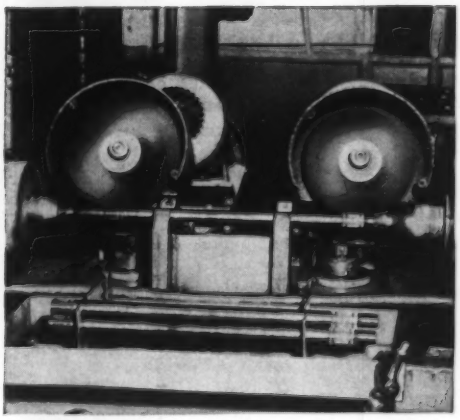
Address_____

City_____ Zone____ State_____

New quality finish gives transmissions longer life

FINE particles of steel, especially burrs, entering complex automatic transmissions cause excessive wear, possible failure.

Automatic, production-line brush finishing equipment, as found in major automotive plants, removes all burrs from precision-fitting transmission parts. In addition, it produces microinch surface finishes never before achieved . . . to increase transmission life.

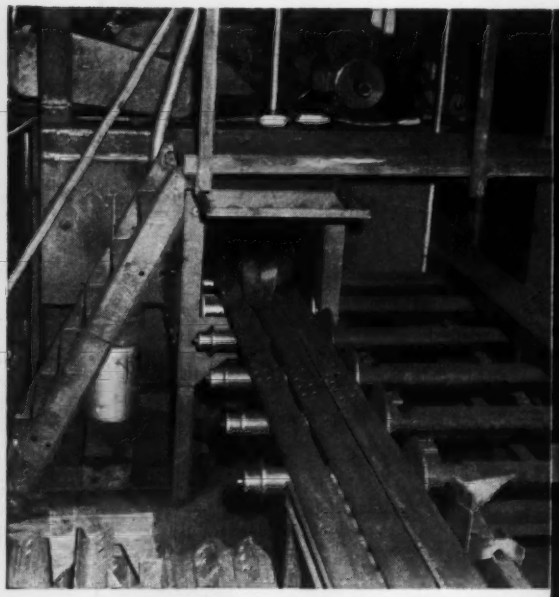


Transmissions are one of thousands of products whose quality is improved through Osborn's power brush finishing. Yours can be another. Write *The Osborn Manufacturing Company, Dept. G-41, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes

OSBORN

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES



Provincial Engineering Company, Ltd.

WHEELABRATES STRUCTURALS Before Galvanizing . . . Saves 7 Ways

Provincial Engineering Co., Ltd., of Niagara Falls, Ont., improved galvanizing operations on structural steel and fabricated members and saved seven ways with Wheelabrator airless blast cleaning. Long structurals such as sections of power transmission and radio towers are cleaned in a straight line production cabinet prior to hot dip galvanizing. Small angles, clip angles and other fabricated pieces which can be tumbled are cleaned in batch lots in a Wheelabrator Tumblast.

Wheelabrating has cut the preparation cycle from 50 minutes to only 7 minutes, and production has increased 2½ to 3 times. The company for the first time in its history has a steady flow through the plant.

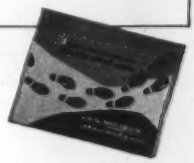
Through the use of Wheelabrator Steel Shot as the abrasive in the Wheelabrators, a steadily decreasing dross loss has resulted compared with that experienced when the steel members were cleaned by pickling.

Rejects now are virtually nil, which has helped to eliminate one acid tank, and its attendant costs and disposal problems. In addition, labor turnover is low now because of improved working conditions. Investigate Wheelabrating today for cleaning of steel in all types of operations.

THE SEVEN SAVINGS

1. **Dross loss reduced.**
2. **Labor turnover ended.**
3. **Output increased 2½ to 3 times.**
4. **Rejects virtually eliminated.**
5. **Cleaning cycle cut from 50 to 7 minutes.**
6. **Large acid savings effected.**
7. **Handling and processing labor drastically reduced.**

For more details on faster, better cleaning with a Wheelabrator, send today for Bulletin 864.



WHEELABRATOR
CORPORATION
(Formerly American Wheelabrator & Equipment Corp.)

509 S. Byrkit Street, Mishawaka, Indiana

World's Largest Builders of Airless Blast Equipment

STEEL
The Metalworking Weekly

FEBRUARY 27, 1956
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FREE
TEXT
An accurate and useful 76 page compilation of chain data. A valuable textbook for engineers . . . grows to be indispensable. Free upon request to Dept. 10 U. ACME CHAIN CORP., Holyoke, Mass.

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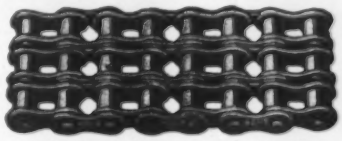
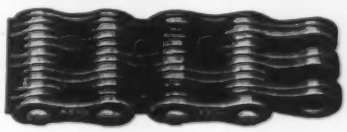
AND PROMPT DELIVERY
ON ALL THESE CHAINS

STANDARD ROLLER CHAINS
Available in pitches from ⅜" to 2½" riveted and detachable type.



STANDARD MULTIPLE WIDTH
Multiple widths of six strand or wider available for special application.

DOUBLE PITCH CHAIN
For use in slower speed power transmission and material handling conveyors.



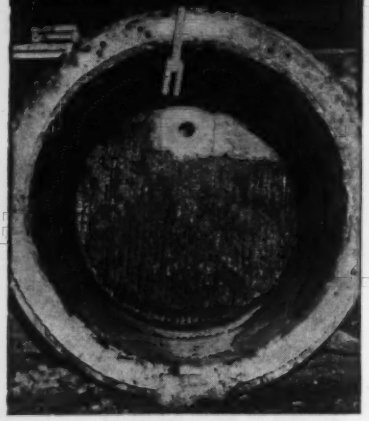
CABLE CHAINS
Acme Cable Chains are furnished in a variety of pitches, widths and strength.

SPROCKETS
Acme Sprockets are available in a wide range of sizes, in all types.

PHONE JEfferson 2-9458.

Acme Chain Corporation
HOLYOKE MASSACHUSETTS

WHAT'S NEW in REFRACTORIES for the STEEL INDUSTRY



There is something new under the sun. It's new **C & G Mix** by WALSH . . . an economical mix for lining and patching ladle wells in open hearth and electric furnace shops.

Formulated to offer greater protection against washouts, it has remarkably easy workability and is low in cost, affording you greater dollar value through increased service life.

Packed dry in 100 lb. bags, Walsh **C & G Mix** is also available in bulk.

Write for complete details.

Specialists in Refractories of High Bulk Density and Low Porosity

WALSH REFRACTORIES CORPORATION

101 FERRY ST. · ST. LOUIS 7, MO.

FOR OVER 60 YEARS MANUFACTURERS OF HIGH GRADE REFRACTORIES

behind the scenes

P.R. in Full Cry

"As a worn out editor retreaded in charcoal gray, but not yet awarded the Order of the Brimless Hat," writes ex-steel staffer Samuel W. Baker, public relations man with Burson-Marsteller Associates, Inc., 11 E. 36th St., N. Y., "I'm taking umbrage (with lemon twist) at your caterwauling column of Feb. 6, (Sound Off)."

This spirited reply was stirred up by our reference to the Lindberg Engineering Chorus, and our comment that its efforts were more efficacious than those of a platoon of correctly costumed public relations men.

"Seriously," Sam continued, "there is plenty being done by companies with a human approach to community and public relations without expectation of monetary return. As an example, I enclose an article from the January issue of *American City* magazine, which describes activities in this important sphere by our good client, Rockwell Mfg. Co."

There, there, Sammy boy! of COURSE other companies are in there pitching. Consider Lukens Steel Co., for example. Edwin C. Watson, editor *Lukens Life*, tells us about their wonderful chorus. "It is made up of company employees and their wives or husbands," he explains. "The group rehearses on its own time. It has been organized about five years, and gives about 25 concerts a year. Highlights of 1956 will be an appearance at the 25th anniversary meeting of the Pennsylvania Industrial Management Clubs at Harrisburg, and a June engagement at the Fred Waring Choral Workshop at Delaware Water Gap."

Venerable Journal

Last week we were introduced to the oldest metalsmith publication in the world, *The American Ironsmith*. This worthy journal is the official organ of the National Blacksmith and Welders Association, and has been published since 1875.

Articles concern plowshares, grillework, horseshoes and association doings. Did you know that if a horse doesn't have a level foot, he'll knock the bejabers out of his knees when he accelerates, and very likely will wind up with corns, splints, spavins and ruptured suspensory ligaments?

The American Ironsmith prints homespun verse, too, in a department called "Rhymes and Reminants". One such poem, a wife's tribute to her ironsmith husband, includes the following thoughtful and expressive stanza:

His hair may be limp; and somewhat long,
No time to get it cut.
His brow is wet; with honest sweat,
To fix someone's putt-putt.
He looks the whole world in the face,
And wonders if he's in a rut?

Dated News

G. D. Ashworth, Superintendent, Burch Plow Works, Inc., Evansville, Ind., is moved to wonder at the timing of news releases, particularly one about wire litter-baskets, reference to which appeared in STEEL and the New York Sunday *News*. "We always get our news ahead of time here," wrote Mr. Ashworth, "as you will note on the enclosed page from the N. Y. Sunday *News*, dated Feb. 12, and today is only the 8th, but STEEL had it on Feb. 6. I don't know. Like the kids say, it's a crazy mixed-up thing."

You forgot to mention, sir, that *your* letter was dated Feb. 9!

Cover Boy

The appealing little rascal who appeared on STEEL's Feb. 13 cover, dressed in clothes too big for him illustrating the article "It's Time To Grow", was snatched out of school to pose. He was sent home in a cab, too, and we understand that he has made life miserable for his father ever since, repeating demands for half holidays, taxi rides and men's clothing.

"I don't know what to do," said his pappy, STEEL copy editor Harry Chandler. "I suppose it will be alright in summer weather, but now that he has taken to wearing my hat it's rougher on me than it is on him. Ah-h-ah--ah--kerCHOO!"

Shrdlu

(Metalworking Outlook—Page 63)

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Steel doors gulp water to keep from melting

A typical example of B. F. Goodrich improvement in rubber

IT'S 3,000 degrees hot inside those steel mill furnaces. So hot that even the heavy steel doors would melt in minutes without protection. To cool them off, they make the doors hollow and pour water through in a constant flood.

But the doors must move up and down, so flexible hose is needed to feed water in and out. Hot metal spatters on the hose. Big "charging machines" bang it. Heat cooks it 24 hours a day, 7 days a week.

Rubber stand all *that?* B. F. Goodrich engineers believed it could, and designed a rubber hose armored with wire for strength and protected by asbestos for heat. Here's what happened when it was tried at the steel company in the picture.

Where other, more expensive hose burned out in a matter of months, or even weeks, the B. F. Goodrich hose is still good after more than a *year* of constant use. What's more, it is so much lighter, more flexible than other makes that workmen prefer it, and one man can install it where two were needed for other hose.

Finding a way to improve furnace door hose is an example of the B. F. Goodrich method of approaching a customer's problem. We have been able to solve equally difficult ones, just as successfully, in products you undoubtedly use. Your B. F. Goodrich distributor would like to tell you what these improvements are, and how they can be employed for your profit. *The B. F. Goodrich Company, Dept. M-561, Akron 18, Ohio.*

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a complete line of standard products and special steels.

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shearing, forming, torch cutting, blanking, metal sawing and other processing operations, to your specifications.

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JONES & LAUGHLIN STEEL WAREHOUSE DIVISION

JONES & LAUGHLIN STEEL CORPORATION

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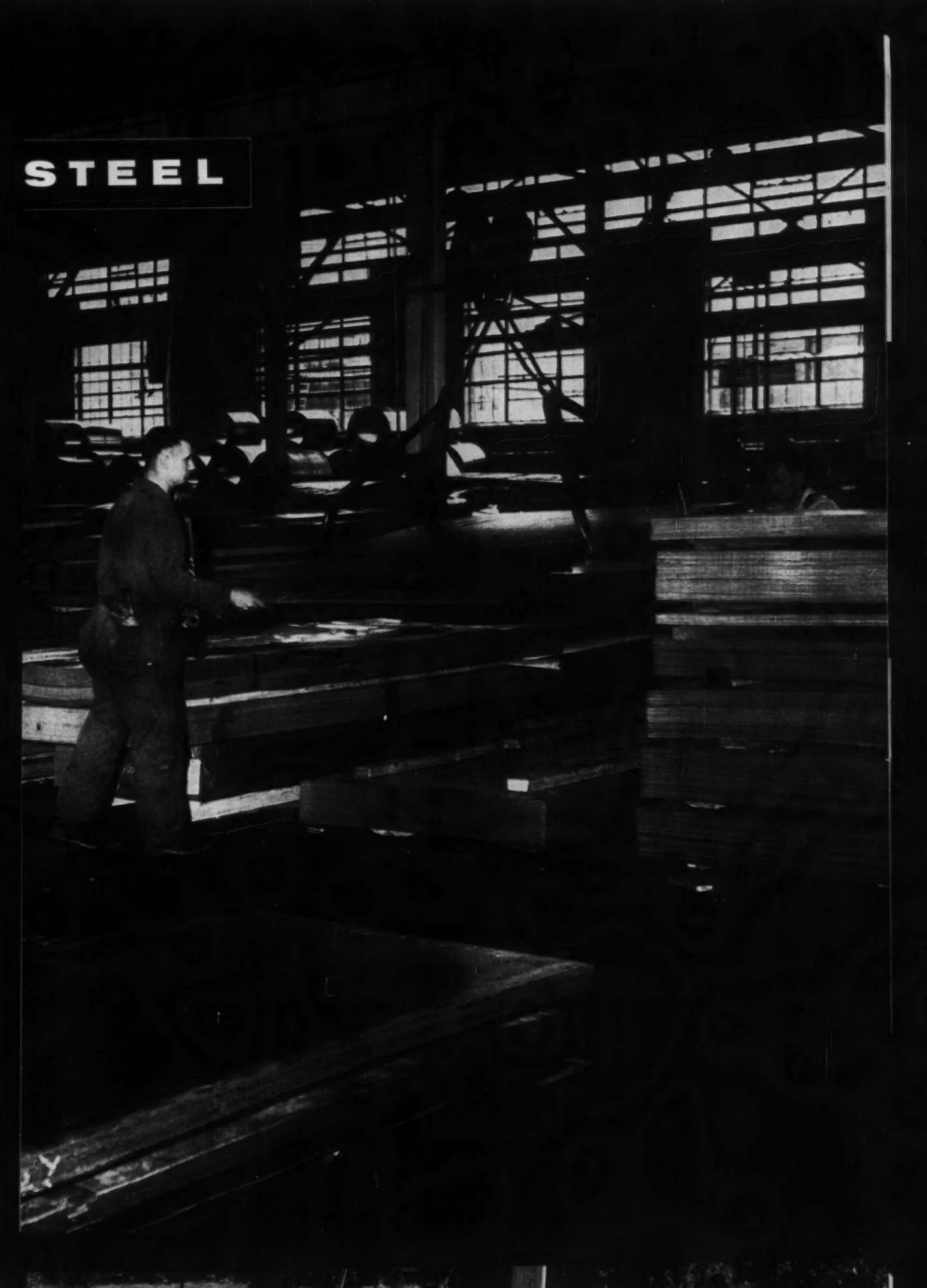
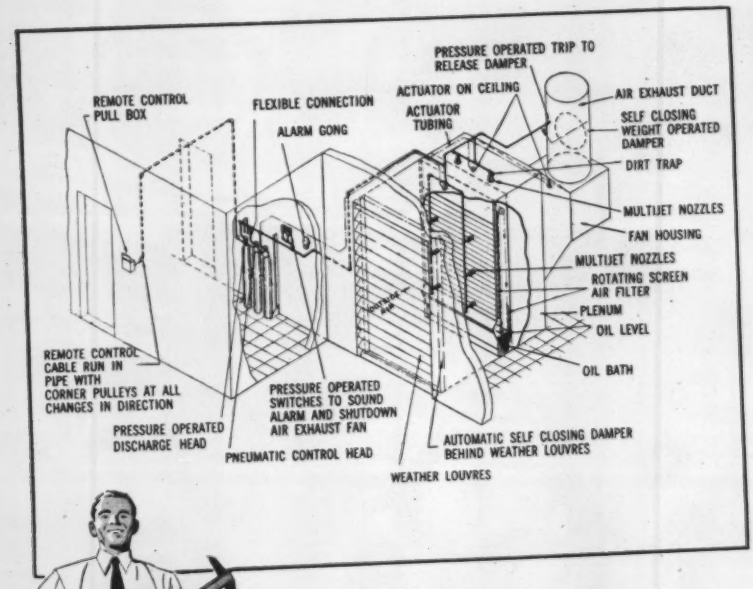

STEEL



Guard oil bath air filters with Kidde engineered fire protection!

LOOK HERE — a fire hazard that could easily turn a building to a heap of cinders — *completely* protected by a tailor-made Kidde CO_2 Fire Extinguishing System! Kidde engineers haven't missed a trick!

At the first sign of fire, rate-of-temperature-rise detectors trigger the system, pressure-operated switches simultaneously close dampers, shut down fans and sound an alarm while fire-killing clouds of CO_2 stop the blaze in its tracks. What protection!

And what features Kidde systems have! Using safe, efficient CO_2, they leave no mess to damage equipment, nothing to clean up after a fire. And their special rate-of-temperature-rise detectors insure *complete* protection 24 hours a day. Kidde systems need no attendance, day *or* night!

Kidde systems have no falling weights, use no clumsy mechanical triggering methods. Pneumatic or Electrical Control Heads insure instant and complete CO_2 discharge. All moving parts of a Kidde system are self-enclosed for safety, need no replacement after a fire, have easy-to-read indicators which show at a glance whether system is "set" or "released." What's more, special Directional Valves let you guard more than one hazard from the same cylinder bank, giving you the most *versatile* protection on the market today!

It's easy to get the *best* in fire protection. For information about *your* specific problems, write Kidde today.

Kidde (K Kidde)

Walter Kidde & Company, Inc.
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Walter Kidde & Company of Canada, Ltd., Montreal—Toronto

The words 'Kidde', 'Lux', 'Lux-O-Matic', 'Fyre-Freez' and the Kidde seal are trademarks of Walter Kidde & Company, Inc.

LETTERS TO THE EDITORS

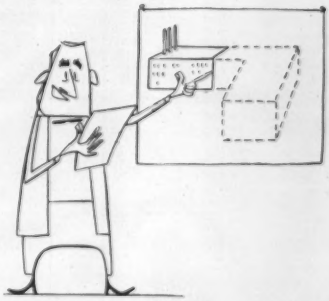
Guide to Recruiting Procedure

Please send six copies of the article, "More College Recruiting?" (Jan. 23, page 40).

We have done the recruiting for our company since 1948. Your summary of the current situation is an excellent one. It also will be of value to us for its procedural suggestions.

Jay Tomlin
Director—Public Relations
Illinois Tool Works
Chicago

Now Is the Time



We want to congratulate you on the fine article, "It's Time To Grow" (Feb. 13, page 81). It was excellent in its projection, detail and documentation.

We would appreciate three copies, and we are looking forward with interest to the rest of the 1956 Program for Management.

Carl F. Gangloff
Executive Secretary
Greater Youngstown Area Foundation
Youngstown

Please send two reprints. It is timely, interesting and informative.

L. W. Ingold
Sales Manager
Pittsburgh Forgings Co.
Coraopolis, Pa.

Resin Glues Helicopter Blade

We note your reference to adhesive resin used in fastening together two halves of a helicopter blade, in the Technical Outlook column of Jan. 23, (page 69). Could you tell us where to get more data on this adhesive?

L. M. Smoyer
Brey-Krause Mfg. Co.
Allentown, Pa.

• *Write: Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.*

Quality Control of Sheet Metal

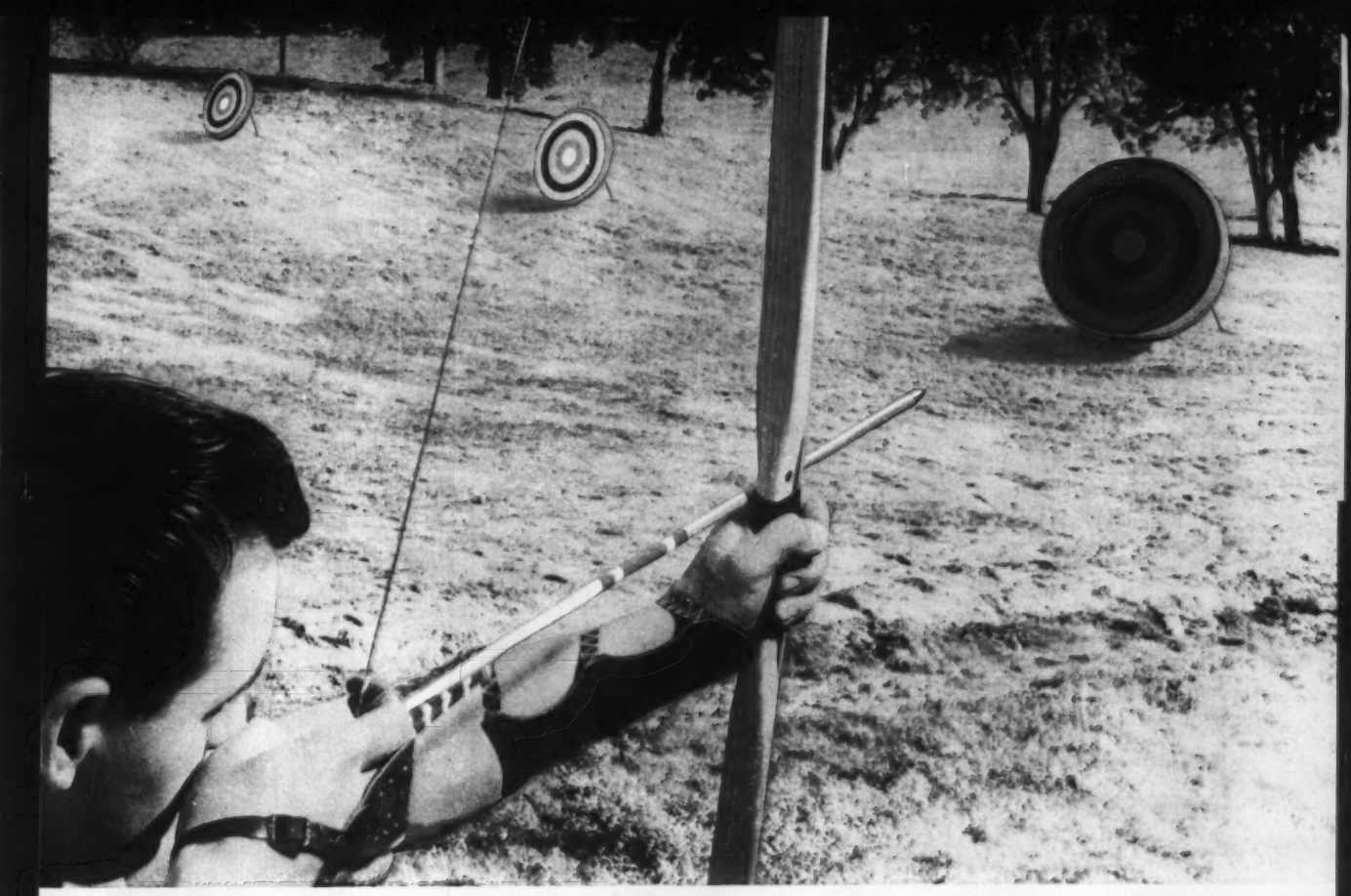
We are writing for information. Where can we get data—either in literature, a movie or other sources—on quality control in a sheet metal manufacturing factory?

E. H. Mickelson
Vice President-Director of Purchases
Queen Stove Works Inc.
Albert Lea, Minn.

• *We are forwarding the article, "Steel Buying by Statistics" (April 18, page 104).*

Another help might be the booklet, Quality Control and Research, *which*

(Please turn to page 12)



How to have 2 strings to your bow...

...SWITCH TO CIMCOOL°, the radically new and different coolant that has become, in a few years, the largest selling chemical-lubricant cutting fluid in the world. Here are two big advantages of CIMCOOL Standard Concentrate over old-fashioned cutting fluids:

CIMCOOL DOES A BETTER JOB because of its chemical lubricity. It permits faster speeds and increases tool life, for it combines friction reduction and cooling capacity in a degree never before attained.

CIMCOOL LOWERS COSTS because it lasts longer in machines. Thus, it reduces downtime and cuts labor costs for cleaning and changing.

For information on the many specific advantages of CIMCOOL Standard Concentrate—or details on the entire family of CIMCOOL Cutting Fluids—just contact us. We'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

°Trade Mark Reg. U.S. Pat. Off.

CIMCOOL CUTTING FLUIDS

CIMCOOL **Concentrate**—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

CIMCOOL **Tapping Compound**—Permits the use of highest tapping speeds and increases tap life amazingly.

CIMPLUS The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and as a water conditioner with CIMCOOL Concentrate.

CIMCUT **Base Additive**—For jobs requiring an oil-base cutting fluid. Added to mineral oils, it gives an economical mix for higher speeds and feeds.

CIMCOOL **Bactericide** — The most effective agent yet developed to overcome rancidity and foul odors.

CIMCOOL **Machine Cleaner** — The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

CIMCOOL Cutting Fluids

for 100% of all metal cutting jobs

PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.

Twin Disc Model 21 HCS Fluid Coupling, shown installed between 100 hp 1200 rpm motor and secondary crusher owned by Shawinigan Chemicals, Limited, Carbide Division, Shawinigan Falls, Quebec, Canada. Twin Disc Fluid Couplings are provided in 10 models, with all input, output variations, for motors and engines from ¾ to 850 hp.

Fluid drive on crusher SAVES $3,000 A YEAR

With a secondary crusher in their Carbide Division, Shawinigan Chemicals, Limited, was having a $3,000-a-year maintenance headache.

The ailment? *Mechanical connection.* Uneven loading—inescapable on this operation—was pulling the motor down to a stall condition, where it delivered locked-motor torque and severely damaged the crusher.

The cure? *Fluid* connection . . . a Twin Disc *twin-circuit* Fluid Coupling, installed between the 100 hp 1200 rpm motor and the crusher. Smooth, automatic, fluid "slip" *absorbs* the shocks—keeps the motor from pulling down—while gradually, steadily picking up the load. Maintenance costs since installing the Fluid Coupling: *none.*

You can do the same for powered equipment in your plant. Write Twin Disc, Dept. DS, Racine, Wis., *today* for Fluid Coupling Bulletin 144-D.

TWIN DISC

TWIN DISC

Fluid Couplings

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

Branches or Sales Engineering Offices: Cleveland • Dallas • Detroit • Los Angeles • Newark • New Orleans • Tulsa

LETTERS

(Concluded from page 10)

provides pointers on developing products for tomorrow's markets. Get it from the Scientific Apparatus Makers Association, 20 N. Wacker Dr., Chicago 6, Ill.

The American Society for Quality Control Inc., Room 563, 50 Church St., New York 7, N. Y., also has material on quality control.

Copy into Permanent File

Please send a reprint of your article, "Heat Treating Steel Castings" (Jan. 23, page 84). I found it very informative and would like a copy for my permanent file.

Robert A. Cook
Advertising Department
Hevi Duty Electric Co.
Milwaukee

Chart Okay for Distribution

Do you have for distribution a chart showing scrap prices for the last few years? If you have, we would appreciate a copy.

U. A. Nystrom
Treasurer
Fairfield Engineering Co.
Marion, O.

• *We are sending you a copy of our 1956 Metalworking Facts and Figures (Jan. 2, page 145). The scrap chart will be found on page 161. It charts the price composites from 1944 through 1955 on steelmaking scrap, pig iron and finished steel.*

Sonic Testing of Weld Quality

We have been advised that the Dec. 5, 1955, issue carried an article on the sonic testing of the weld quality of 0.065 x 3 in. diameter welded tubing.

We have been interested for some time in the possibility of continuously inspecting the weld on our irrigation tubing. We would appreciate extra copies.

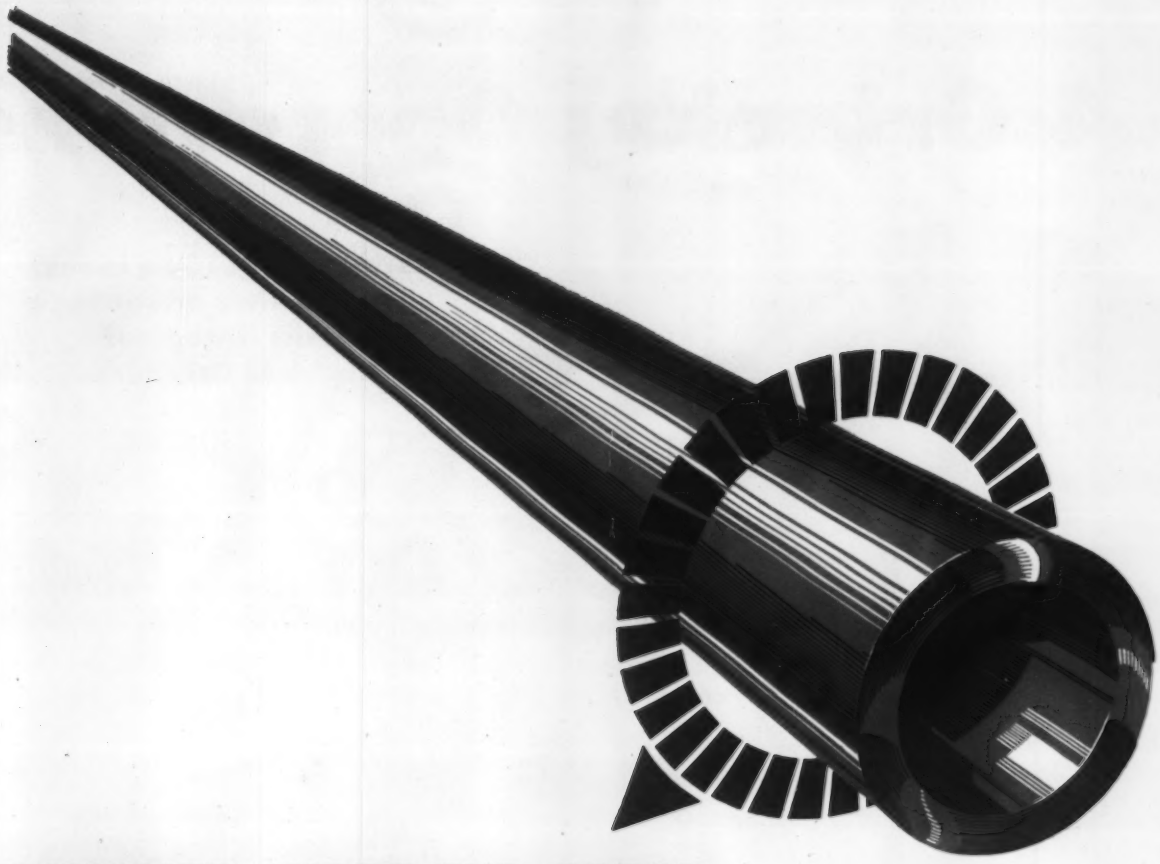
V. F. Binkley
Chief Metallurgist
Kaiser Aluminum & Chemical Corp.
Spokane

• *We are forwarding three copies of this article, "Weld Inspector Sees with Sound" (page 122).*

Articles of Current Interest

Your articles, "Market Facts: Where You Find Them and How To Use Them" (Oct. 24, page 91) and "Saving Dollars in Manufacturing" (Oct. 24, page 104), are of extensive interest to us. If reprints are available, we will be grateful to receive a copy of each.

R. E. Mahr
Supervisor-Materials Laboratory
Engineering Division
Missile Branch
Chrysler Corp.
Detroit



ELIMINATE SHORT-END SCRAP WITH ASARCON 773 (SAE 660) CONTINUOUS-CAST BEARING BRONZE

Asarco Continuous-Cast Bronze is available in any length you need. You are not bound by the 12-inch or 13-inch standard lengths common to other types of castings. You buy Asarcon Bronzes in exact multiples of your part length plus saw-cut. You pay only for the metal you use.

Parts made from continuous cast bronze have longer life because Asarco's Continuous-Casting process produces alloys of exceptional uniformity. Fatigue characteristics and impact strength are increased as much as 100 percent, and yield strength is up from ⅓ to more than 50% that of the same alloys produced by other casting methods.

Diameters of Asarcon Bronzes now range from ½ inch to 9 inches in any size you need. Many foundry alloys and a variety of shapes are made to order in all of these sizes. Asarcon 773 can be shipped directly from distributors' stocks or from our New Jersey and Indiana plants.

Continuous Cast Products Department

AMERICAN SMELTING AND REFINING COMPANY

Perth Amboy Plant, Barber, New Jersey • Whiting, Indiana

WEST COAST SALES AGENT: Kingwell Bros. Ltd., 457 Minna Street, San Francisco

IN CANADA: Federated Metals Canada, Ltd., Toronto and Montreal

ASARCO

4 Grinding Operations

Versatility . . . an investment-saving advantage of Landis Universal Cylindrical Grinders

12" x 36" Landis Universal with swinging internal fixture and hydraulic rapid wheel head positioning.

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precision grinders

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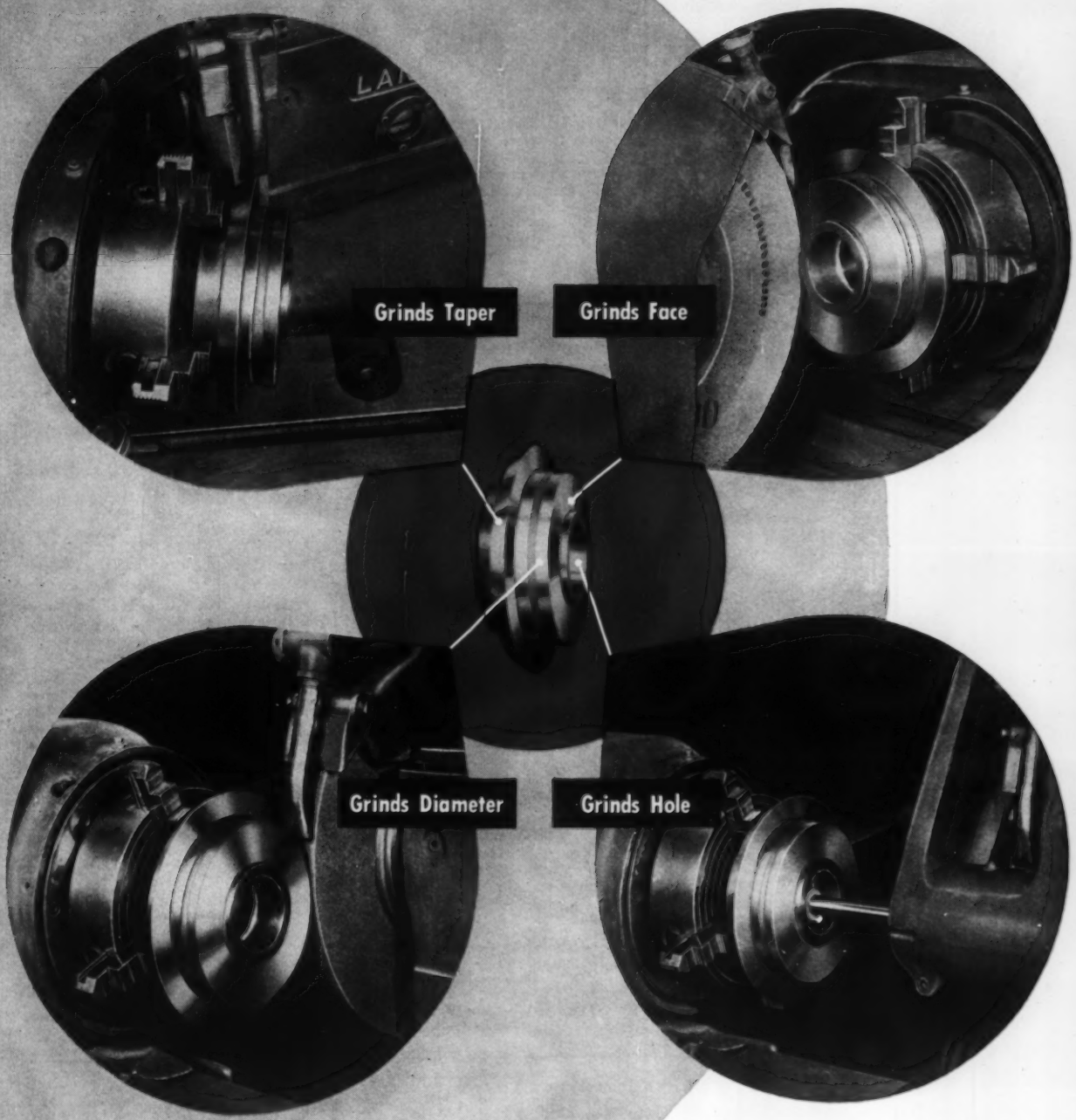
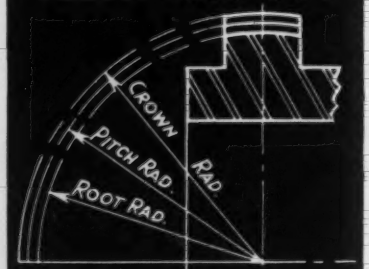


LANDIS TOOL COMPANY / WAYNESBORO, PENNA.

Here's the Big DIFFERENCE

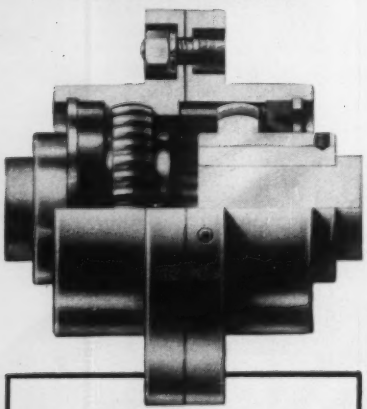
TEETH ARE CUT



ON A TRUE ARC

SPHEREFLEX®

COUPLING



SPHEREFLEX tooth design features an exclusive curved root and spherical tooth flank. Both angular and linear (parallel) misalignment are compensated for, since every portion of each gear tooth is actually a segment of a sphere. This special design eliminates all possibility of tooth interference and permits increased deflection between mating members. Full and uniform line contact, through the working depth of the tooth, insures a stronger coupling between driver and driven shafts; eliminates point rolling contact between gears during flexing; compensates for shaft misalignment up to 14° included angle. Send for Catalog C-560

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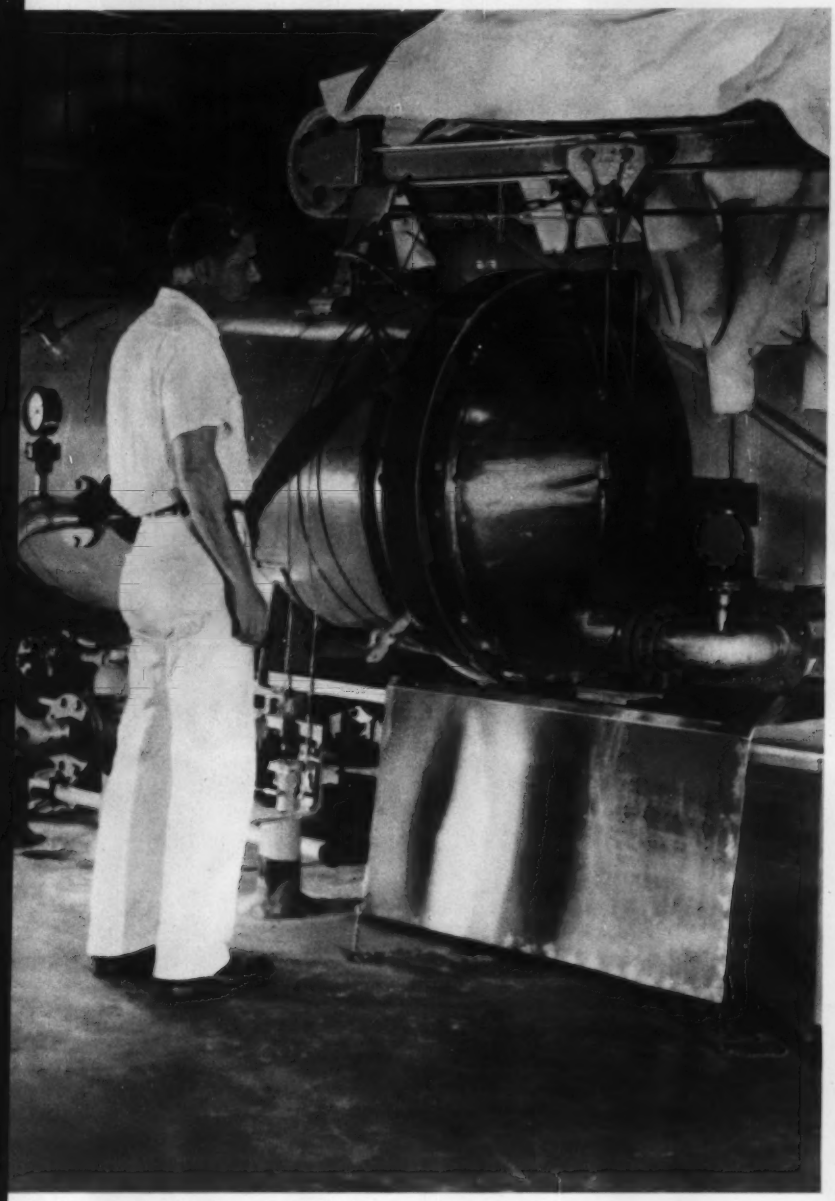
NOTHING *can equal Stainless Steel*



FOR CORROSION RESISTANCE. The Norwich, N. Y. plant of Norwich Pharmacal Company is a magnificent display of Stainless Steel. Shown here is a Stainless Steel filter, used to separate mother liquor from the solids of furoxone. Here, Stainless outlasts any other practical metal by two to one.

FOR EASY CLEANING. In this textile plant of W. J. Dickey & Sons, Inc., dyeing time *and* costs have been cut 50% with the use of Stainless Steel equipment. When colors are changed, tanks don't have to be boiled out. With its smooth, dense surface, Stainless can be cleaned easily and quickly.

FOR CONSUMER APPEAL. Now, just about every housewife knows what Stainless Steel is. When she sees the Stainless tub in this automatic laundry, made by Speed Queen Corp., Ripon, Wis., she knows that there is nothing to corrode. She knows, too, that the Stainless tub will stay bright and clean and will last forever.

No other design material can match Stainless Steel in its *combination* of desirable properties: corrosion resistance, strength and hardness, beauty, cleanability and easy fabrication. When buying Stainless, remember that United States Steel offers the widest range of types, finishes and sizes available in the United States.

USS STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

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How U. S. Steel's **Robert Blacka** inspects the shaft for America's first full scale atomic power plant

You've read about our nation's first nuclear reactor power plant. It will be operated by Duquesne Light Company at Shippingport, Pa.—near Pittsburgh. Capacity will be a minimum of 60,000 kilowatts, using enriched and natural uranium as fuel, and light water as the moderator.

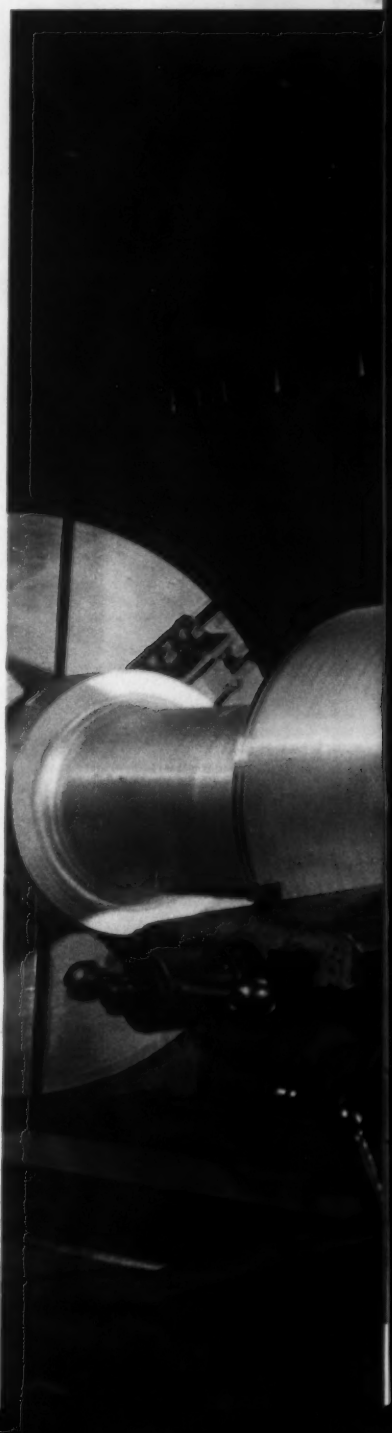
Westinghouse Electric is building the turbine generator. The first turbine shaft that will be installed is the one in the big picture, a USS Quality Forging being sonic-tested by Robert Blacka who has been a United States Steel Inspector for 16 years.

The instrument sends sound waves through the steel. The waves bounce back from the other side, and the entire journey is shown on the oscilloscope tube. Any imperfection in the steel sends a separate "echo" that can be analyzed by a skilled inspector.

Of course, there are other tests: macro-etching and microscopic examination, physical testing of bars to determine strength levels and ductility, magnetic particle and borescope inspection plus others—depending on customer needs.

USS Quality Forgings are very frequently specified when the buyer cannot tolerate the slightest compromise with quality. Part of the reason lies in United States Steel's complete array of test facilities—in the hands of seasoned inspectors who know how to use them.

Write for our free 32-page booklet on USS Quality Forgings. Address United States Steel, Room 5140, 525 William Penn Place, Pittsburgh 30, Pennsylvania.



USS QUALITY FORGINGS

USS

- heavy machinery parts . . . carbon, alloy, stainless
- forged steel rolls and back-up roll sleeves
- electrical and water wheel shafts
- specialty forgings of all types

UNITED STATES STEEL

SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

"We've found that refractory concrete furnace walls like this have a better K insulating value than conventional masonry walls," reports masonry superintendent Floyd Colledge, Homestead Works, United States Steel Corp., Munhall, Pa. Packaged castable used on this job: Laclede-Christy's "Steel Cast."

50-foot furnace side walls still like new after 4 years of service at 2200°F.

"We build our long furnace walls of anchored refractory concrete for greater stability and increased resistance to thermal stresses and strains," reports masonry superintendent Floyd Colledge. "Some of these refractory concrete walls have been in service over 4 years and are still in excellent condition."

Refractory concrete furnace walls made with Lumnite* calcium-aluminate cement or Lumnite-base castables can save time and money in your plant, too. Construction is fast and easy—just pour refractory concrete in simple wooden forms. No costly fitting at joints or around portholes. And refractory concrete made with Lumnite reaches service strength within 24 hours!

You'll find many other uses for refractory concrete made with Lumnite. And you can make refractory concrete *designed for your specific job* by just adding water to a factory-prepared castable mix. Keep a supply of Lumnite cement or Lumnite-base castables on hand for emergency needs. Castables are made and distributed by leading manufacturers of refractories.

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*"LUMNITE" is the registered trade-mark of the calcium-aluminate cement manufactured by Universal Atlas Cement Company.

S-L-119

Atlas® Lumnite Cement

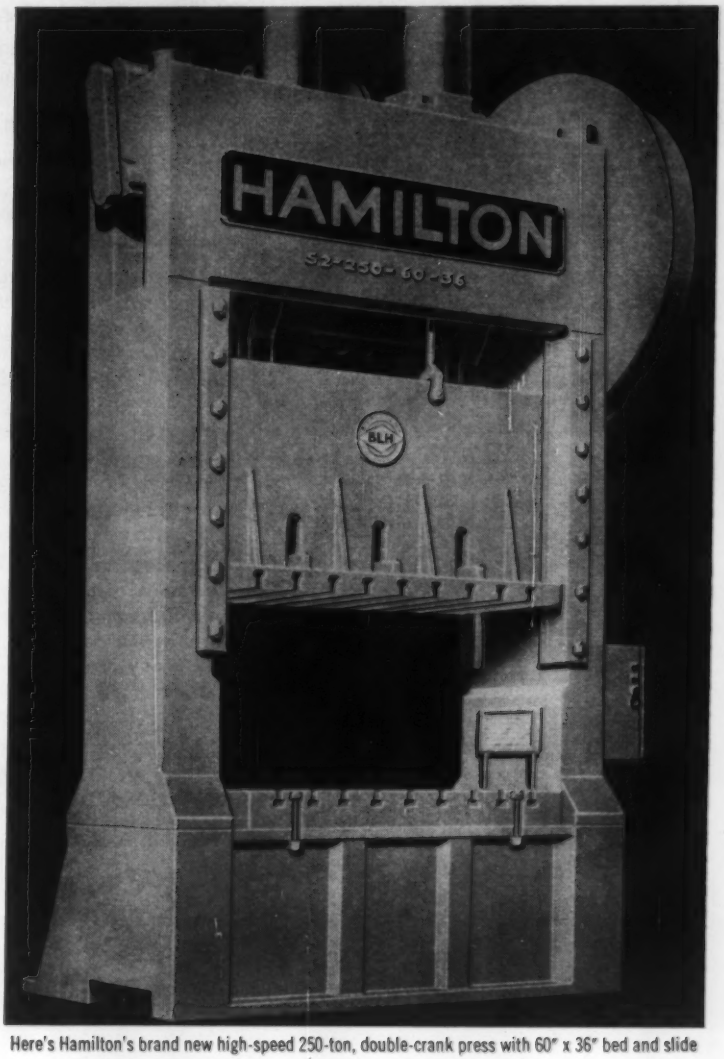
FOR INDUSTRIAL CONCRETES

REFRACTORY • INSULATING • OVERNIGHT • CORROSION-RESISTANT

United States Steel Hour—Televised on alternate Wednesdays—See your local newspaper for time and station.

News from Hamilton!

100 to 300 ton press line sets new standards



Here's Hamilton's brand new high-speed 250-ton, double-crank press with 60" x 36" bed and slide

For the first time in the industry, Hamilton gives you 100 to 300 ton presses built to meet exacting automotive production standards . . . standards pioneered in the automotive field through more than thirty years of Hamilton press leadership.

Every one of these 2-point, single acting, straight-side, double-crank presses is a brand new design. Each is engineered for constant top-speed, top-quality production—without profit-robbing downtime. Each is built for complete operating flexibility. Here are just a few of Hamilton's built-in extras that mean more operating profit for *you:*

- rugged welded steel construction
- mechanically interlocked air clutch and brake
- barrel-type motorized slide adjustment
- automatic lubrication
- pneumatic flywheel brake
- die lights
- die cushions
- pneumatic counterbalances
- interlocked electrical clutch control

Exact specifications are adjustable to your individual requirements. Special electrical controls are available to meet particular electrical standards.

It will mean money in your pocket to find out today how these all-new Hamilton presses can help you turn out high quality stampings fast . . . without costly production downtime. Get the full story on these new standards for 100 to 300 ton presses . . . from Hamilton Division, BLH Corporation, Hamilton, Ohio.

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this 140-TON horizontal milling machine

There's never been one like it before!

Just a press of a button puts this mighty Schiess into action. A 25-ft. high column moves smoothly along 45-ft. long bedways. Never a vibration—no chatter—even at maximum transversal loads! The new Schiess design of the spindle heads has eliminated this!

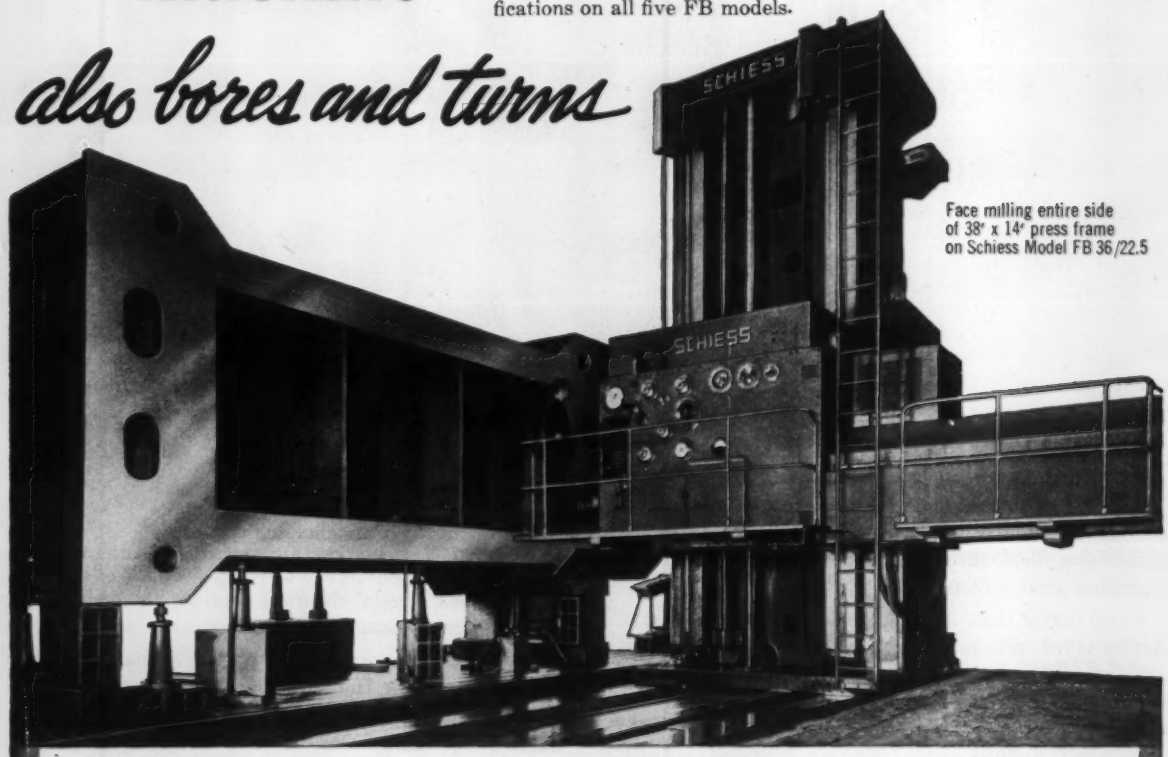
THE MILLING OPERATION. A huge tungsten-carbide cutter in a 14¼" spindle goes to work on the stock. And performs its operation with a consistent accuracy—a surface-finish count—never before obtainable on such a big fellow.

THE BORING OPERATION. Another press of a button! Another spindle goes to work—bores a 79" depth in one cut—or a total depth of 118". Boring and milling spindles are provided with 36 speeds of which the top 12 are V-belt transmitted. Rapid traverse, feeds and manual controls of the two spindles are completely independent.

That this mighty machine has tremendous productive capacity is self-evident. And its productivity goes far beyond conventional milling and boring. Schiess attachments increase its scope to taper-milling, thread-cutting, copying and, in certain instances, copying in 3 dimensions. It's a time saver, too. Can go from feed to rapid traverse immediately, without complicated adjustments.

The Schiess Model FB 36/22.5 Horizontal Milling and Boring Machine is a product of Europe's largest builder of heavy machine tools. Parts and service are as close as Pittsburgh. An American Schiess Engineer will be happy to help you size up these heavy producers for your heavy production needs. Write for catalogs and complete specifications on all five FB models.

also bores and turns



Face milling entire side of 38' x 14' press frame on Schiess Model FB 36/22.5

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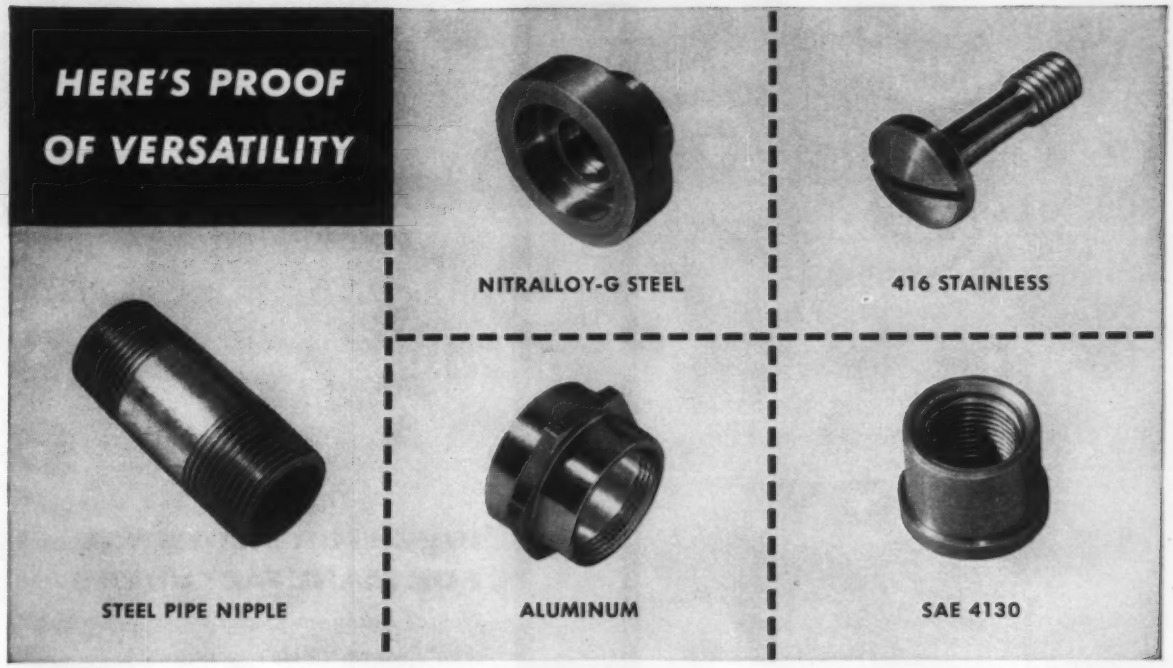


SUN DEVELOPS VERSATILE NEW CUTTING OIL FOR SCREW MACHINES AND JOB SHOPS

New cutting oil, Sunicut 5534, is moderately priced... gives excellent machining results on wide range of steels

New Sunicut 5534 is a non-emulsifying, transparent cutting oil specially compounded to give above-average machining results to operators who want a single oil to machine a large variety of ferrous metals.

Tests have proved that new Sunicut 5534 meets this demand for an all-purpose cutting oil. It is ideal for general screw machine and turret lathe work. It is also excellent for tapping, drilling, threading, and light stamping operations. In addition, new Sunicut 5534 can be used on many special machining jobs, both high and low speed, with metals ranging from B1112 to 4130 as well as free-machining stainless steels.

For complete information about new Sunicut 5534 and how it can help you reduce your oil inventories... lower your production costs... see your Sun representative. Or write SUN OIL COMPANY, Phila. 3, Pa., Dept. S-2.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

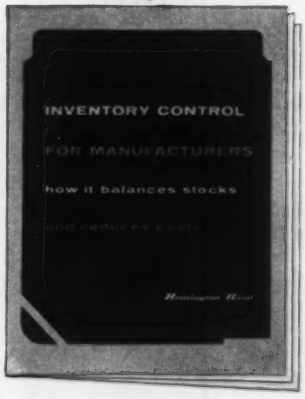
SUN OIL COMPANY, PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

Get your free copy of this new booklet

INVENTORY CONTROL FOR MANUFACTURERS

How It Balances Stocks And Reduces Costs



THIS NEW comprehensive, illustrated booklet, "Inventory Control For Manufacturers," is filled with the most effective, modern techniques for balancing stocks and reducing costs.

Inventory represents about one-third of the capital invested in manufacturing and usually is the largest item on the balance sheet outside of plant and equipment. OVERSTOCKS result in increased investment, useless tying up of capital, increased insurance, the use of more floor space for storage purposes, deterioration and obsolescence, and other substantial losses. UNDERSTOCKS result in lost sales, extra expense of "rush" orders and last minute buying, and idle shop time waiting for short and undelivered material.

Don't miss this opportunity to get the full picture of what Inventory Control means to Management, Production, Purchasing and Sales. Upon inventory availability and adequacy depend scheduling, workflow and delivery – even such human factors as job stability and good labor relations. Inventory Control is the backbone of all manufacturing operations.

No two plants have the same problems but the principles of a good inventory control record as outlined in this booklet, may be profitably adapted and applied to the needs of any business.

Write today for this new booklet. Ask for KD406– "Inventory Control For Manufacturers . . . How It Balances Stocks and Reduces Costs." Remington Rand, Room 1243, 315 Fourth Avenue, New York 10.

Remington Rand

DIVISION OF SPERRY RAND CORPORATION

Successful Stylists

DESIGN ALONG THESE LINES

Trim lines effectively accented with stainless steel have brought to the modern motor car the exquisite beauty once reserved for only the finest limousines.

Today there's no need for the average motorist to pamper his gleaming trim and accessories any more than he does the body enamel, for corrosion fighting stainless steel keeps its new car brilliance years longer, even under the toughest road conditions.

Discerning designers and stylists are converting more and more car parts to stainless — and an increasing number of these parts are fashioned from Sharonsteel.

Steel buyers who have compared know they can expect a better finish and a more consistent quality — coil after coil — when they specify "Sharon Stainless Steel."

SHARON Stainless Steel

SHARON STEEL CORPORATION Sharon, Pennsylvania

DISTRICT SALES OFFICES: Chicago, Cincinnati, Cleveland, Dayton, Detroit, Grand Rapids, Indianapolis, Los Angeles, Milwaukee, New York, Philadelphia, Rochester, San Francisco, Sharon, Seattle, Montreal, Que., Toronto, Ont.

Crucible stainless steel, type 304, is used throughout this Sparkler standard horizontal plate filter.

Constant filtration of chemicals, pharmaceuticals, foods and liquids subject this horizontal plate filter to pretty rugged corrosive, abrasive and temperature conditions. That's why Sparkler Manufacturing Co. uses all-stainless steel construction.

For stainless, first of all, fights off corrosive attack. And it's strong. Stainless becomes tougher the more it's used . . . which is another way of saying that, with stainless, abrasion is no problem. And neither is cleaning. For stainless steels' smooth, bright surface comes clean with a minimum of effort, . . stays clean longer.

The fact is, stainless makes any equipment stronger, longer-lasting, easier to use. Check with your local Crucible representative for help in selecting the best stainless grade for your job. Or write *Crucible Steel Company of America, The Oliver Bldg., Mellon Sq., Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

CALENDAR
OF MEETINGS

Feb. 27-29, American Management Association: Annual electronics conference and exhibit. Hotel Commodore, New York. Association's address: 330 W. 42nd St,, New York 36, N. Y. Vice president-secretary: J. O. Rice.

Feb. 27-Mar. 2, American Society for Testing Materials: Committee week, Hotel Statler, Buffalo. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

Mar. 5-6, Instrument Society of America, Pittsburgh section: Conference on instrumentation for the iron and steel industry, Hotel Webster Hall and Mellon Institute of Industrial Research. Society's address: 845 Ridge Ave., Pittsburgh 12, Pa. Secretary: Fred Marton.

Mar. 6-8, Society of Automotive Engineers Inc.: National passenger car, body and materials meeting, Hotel Statler, Detroit. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Mar. 11-14, National Association of Waste Material Dealers Inc.: Annual meeting, Waldorf-Astoria, New York. Association's address: 271 Madison Ave., New York 16, N. Y. Managing director: Clinton M. White.

Mar. 12-14, International Acetylene Association: Annual meeting, Hotel Statler, Los Angeles. Association's adress: 30 E. 42nd St., New York 17, N. Y. Secretary: H. F. Reinhard.

Mar. 12-15, National Electrical Manufacturers Association: Mid-winter meeting, Edgewater Beach hotel, Chicago. Association's address: 155 E. 44th St., New York 17, N. Y. Managing director: Joseph F. Miller.

Mar. 12-16, National Association of Corrosion Engineers: Annual meeting and exhibit. Hotel Statler, New York. Association's address: 1061 M & M Bldg., Houston 2, Tex. Executive secretary: A. B. Campbell.

Mar. 13-15, Radio-Electronics-Television Manufacturers Association: Spring meeting, Biltmore hotel, New York. Association's address: 777 14th St. N. W., Washington 5, D. C. Secretary: James D. Secrest.

Mar. 14-16, American Society of Mechanical Engineers: Aviation conference, Hotel Statler, Los Angeles. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 14-16, Pressed Metal Institute: Annual Spring technical meeting, Carter hotel, Cleveland. Institute's address: 3673 Lee Rd., Shaker Heights, O. Managing director: H. A. Daschner.

Mar. 18-20, American Machine Tool Distributors Association: Spring meeting, Hotel Statler, Detroit. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

Mar. 19-20, Steel Founders' Society of America: Annual meeting, Drake hotel, Chicago. Society's address: 606 Terminal Tower, Cleveland, O. Executive vice president: F. Kermit Donaldson.

Mar. 19-21, American Society of Mechanical Engineers: Spring meeting, Multnomah hotel, Portland, Oreg. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 19-21, Society of Automotive Engineers Inc.: National production meeting and forum, Hotel Statler, Cleveland. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Mar. 19-23, American Society of Tool Engineers: Industrial exposition and annual convention, International Amphitheatre and Conrad Hilton hotel, Chicago. Society's address: 10700 Puritan Ave., Detroit, Mich. Executive secretary: Harry E. Conrad.

Mar. 22-23, American Hot Dip Galvanizers Association: Annual meeting, Drake hotel, Chicago. Association's address: 1806 First National Bank Bldg., Pittsburgh 22, Pa. Secretary: Stuart J. Swensson.

Apr. 1-5, American Society of Mechanical Engineers: Oil and gas power conference, Jung hotel, New Orleans. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

ALUMINUM FINISHES

THE FINISHING TOUCH

by A. B. HOEFER
vice president
FREDERIC B. STEVENS, INC.

Will Anodized Aluminum Replace Nickel-Chrome Finishes?

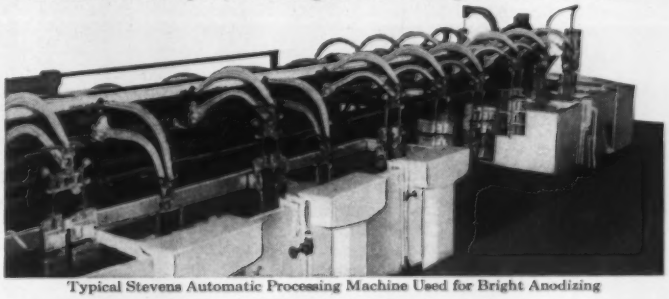
Affirmative answers to this question are revealed in several current business publications and our own sales figures.

Speeding the change is the continued tight supply of nickel. Manufacturers have been forced to look for substitutes for nickel and like the results anodized aluminum have given them.

A trend is developing. Volume of Stevens Automatic anodizing equipment sold in 1955 was nearly double the volume for the two preceding years. At the same time, sales of Stevens compositions used in buffing and polishing aluminum were showing a 50% increase.

Frederic B. Stevens, Inc., manufacture equipment for both nickel-chrome and aluminum finishes. We believe both types of finishes will increase in demand but at the moment the interest in aluminum is high.

If you are considering aluminum for your product, you can be assured that aluminum parts can be bright anodized and finished to compare favorably with the fine finish of chrome plate. In addition, aluminum can be dyed, resulting in non-fading colored finishes.



Typical Stevens Automatic Processing Machine Used for Bright Anodizing

Stevens aluminum anodizing equipment is presently being used and recommended in the finishing of colored anodized tumblers, utensils, refrigerator components, rivets, automotive trim, lighting reflectors, etc.

Stevens' experience in furnishing complete anodizing equipment installations assures you of the latest techniques—the finest finishes—at the lowest costs.

For long range planning consider the versatility of Stevens Automatic equipment. Changes of cycles or processes can be accomplished quickly and inexpensively. Your Stevens Automatic Processing Machine for anodizing can be changed to a nickel-chrome cycle at a later date.

If your design engineers are talking of aluminum to add sales appeal excitement, cost reducing features to your new product lines, let us discuss your requirements with you.

For further information write to Frederic B. Stevens, Inc., Detroit 16, Michigan.

FREDERIC B. STEVENS INCORPORATED
YOUR METAL FINISHING SUPERMARKET
DETROIT 16, MICHIGAN

METAL FINISHING EQUIPMENT AND SUPPLIES FROM CASTINGS OR STAMPINGS TO FINISHED PRODUCT

BRANCHES:
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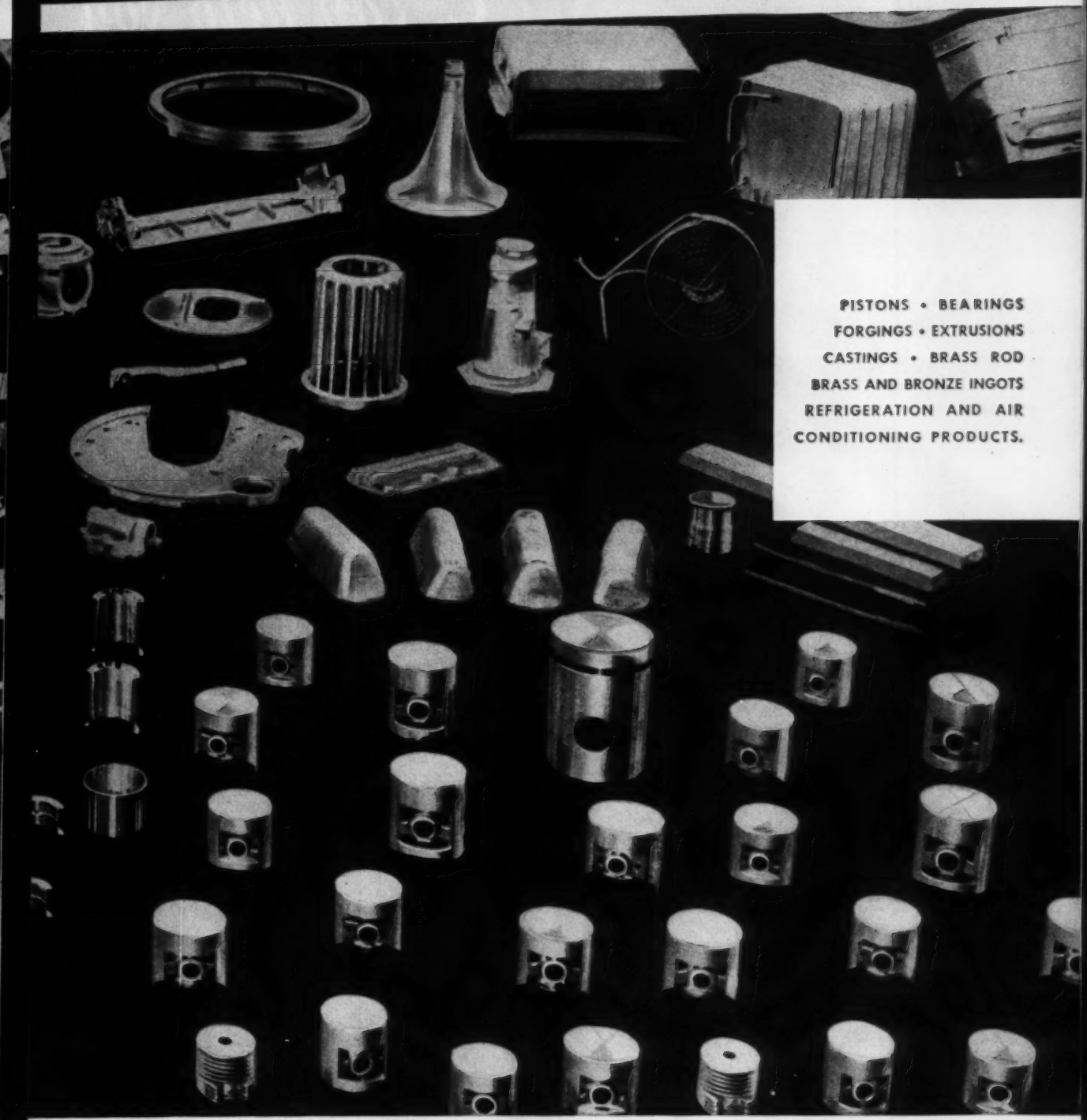
BOHN

the BIG name

BOHN ALUMINUM AND BRASS CORPORATION

1400 LAFAYETTE
DETROIT 26, MIC

in fabricated aluminum !



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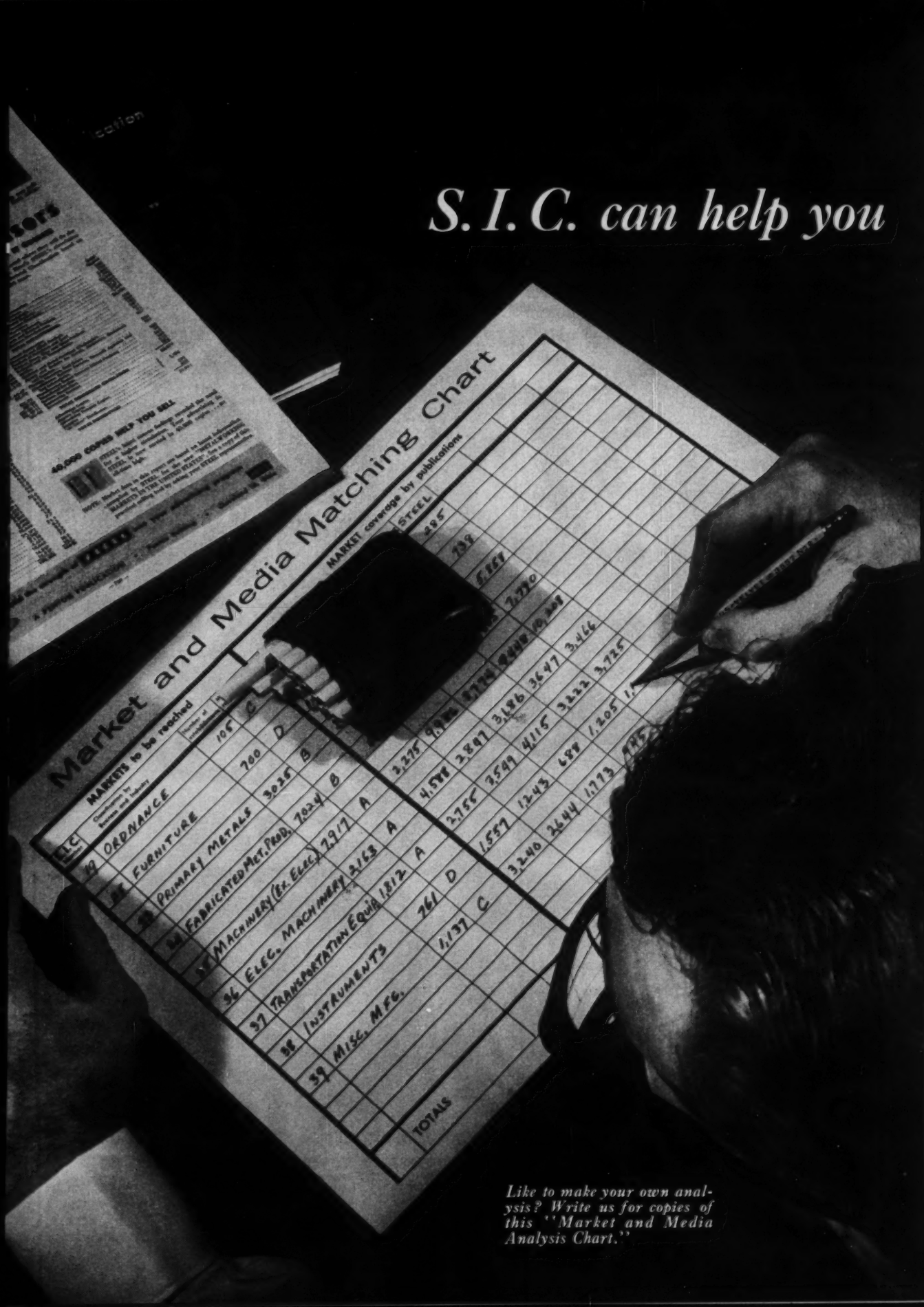
13 SALES OFFICES

9 PLANTS


S.I.C. can help you
Market and Media Matching Chart
MARKETS to be reached
MARKET coverage by publications
STEEL
ELEC
ORDNANCE
FURNITURE
PRIMARY METALS
FABRICATED MET. PROD.
MACHINERY (EX. ELEC.)
ELEC. MACHINERY
TRANSPORTATION EQUIP.
INSTRUMENTS
MISC. MFG.
TOTALS
Like to make your own analysis? Write us for copies of this "Market and Media Analysis Chart."

to match media to markets

How often, in buying business paper space, have you wished for some method of matching circulation to your market?

. . . Or a simplified, fast way of finding out what proportion of the worthwhile establishments and buying power you were reaching with a publication?

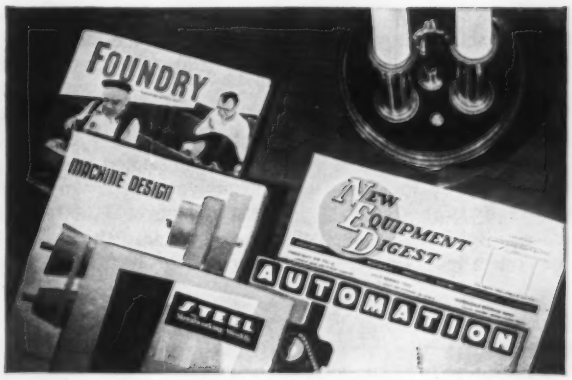
One advertiser calls it, "Taking the hocus-pocus out of circulation".

You can do it with S.I.C.—combined with the Penton Census. Reporting on the Standard Industrial Classification basis is distinctly a PENTON development—and a vital part of the Census Operation.

Take STEEL Magazine, for instance. When you look at the circulation analysis, you'll see how we've already matched circulation to the market for you. To help you quickly find out how we stack up, you can run your eye down the plant counts, and compare the coverage figures for every product category. You can readily see what proportion of the worthwhile establishments you're reaching.

You'll find similar information available on each Penton publication, to aid you in Media Selection.

This method of matching media to the market is made possible through the use of S.I.C. and the Penton Census. It's just one of the advantages of doing business with Penton.



the PENTON
Publishing Company

PENTON BUILDING • CLEVELAND 13, OHIO

Looking for a TOUGHER STEEL?

Unusually tough, even at sub-zero temperatures, Lukens "T-1" steel can reduce equipment costs.

Failure from abrasion or from impact can happen to the steel in your equipment, too. Here's the answer—the tougher steel you've been looking for. Lukens "T-1" steel has excellent resistance to the combination of wear and impact, is tough enough to withstand unusual stresses and pressures as well as shock at either sub-zero or high temperatures, thus lowering maintenance costs and lengthening equipment life.

Equipment builders will find that the techniques of working with this new steel are no different than with carbon steel. Lukens "T-1" steel can be fabricated not only in the shop but also in the field, through proper design procedures. Because of its high yield strength (over 90,000 psi) this new steel offers lighter weight and reduced thickness in comparison to heavier, thicker plates of carbon steel, thereby reducing material, fabrication and shipping costs. And Lukens' range of steel plate sizes—including the widest and heaviest plates available anywhere—makes possible additional savings for equipment builders through the use of wider plates that require fewer welded seams.

The latest addition to Lukens' complete line of carbon, alloy and clad steels, this quenched and tempered alloy plate steel's unusual combination of properties suit it especially to application in pressure vessels, bridges, shipbuilding, construction machinery and general industrial equipment. On problems of design, selection, application and fabricating techniques, Lukens offers full technical assistance. If you would like further information on Lukens "T-1" steel, write to: Manager, Marketing Service, 773 Lukens Building, Lukens Steel Company, Coatesville, Pa.

LUKENS "T-1" STEEL

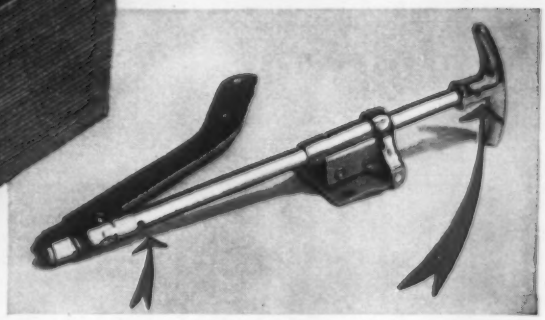
To get the new, 28-page book on Lukens "T-1" steel, ask for Bulletin 781.

THE NEWEST IN A COMPLETE LINE OF ALLOY STEELS

LUKENS STEEL COMPANY, COATESVILLE, PENNSYLVANIA

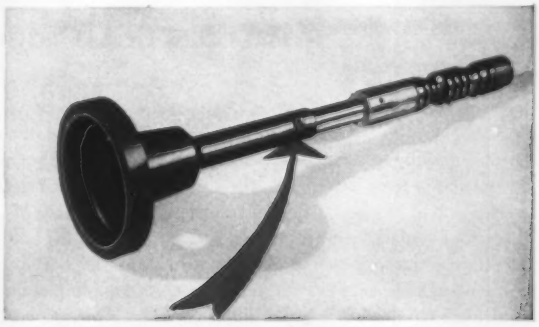
3 Better Methods with ROLLPIN

TO REPLACE A RIVET Rollpin's spring action firmly fastened radio transformer laminations in place and did two things a rivet couldn't do—aligned the laminations and compensated for minor hole variations.



TO REPLACE A STOP PIN Rollpin's self-locking action eliminated staking or peening operations required to retain a straight solid pin.

TO REPLACE A SET SCREW on automobile brake handle, Rollpin is self-retained in the hand grip but can easily be driven into over-drilled hole in shaft to free handle, then removed and used again.



TO REPLACE A DRIVING PIN for a flexible drive shaft on a washing machine, Rollpin cut assembly costs by eliminating precision drilling and reaming

Where can you use this simple fastener?

If you use locating dowels, hinge pins, rivets, set screws —or straight, knurled, tapered or cotter type pins, Rollpin offers the opportunity of a better method that can cut assembly and maintenance costs. This slotted tubular steel pin with chamfered ends eliminates special machining, tapping, and the need for precision tolerances. Driven into a hole drilled to normal production standards, it locks securely in place, yet can readily be drifted out and reused whenever necessary.

ELASTIC STOP NUT CORPORATION OF AMERICA

ROLLPIN TRADEMARK

MAIL COUPON FOR DESIGN INFORMATION

Elastic Stop Nut Corporation of America
Dept. R37-360, 2330 Vauxhall Road, Union, N. J.

Please send the following free fastener information:

- ☐ Rollpin samples
- ☐ Rollpin bulletin
- ☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name _____ Title _____

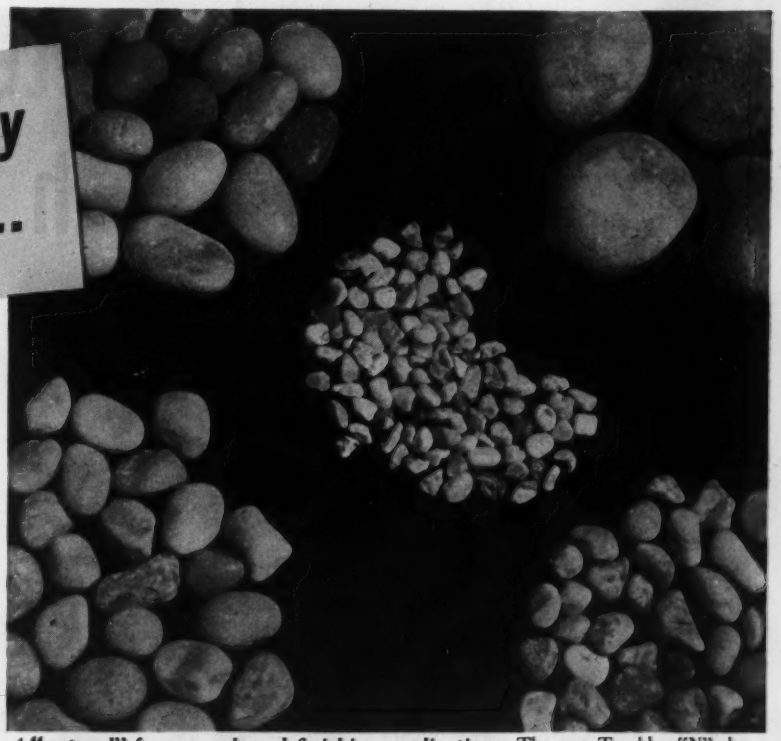
Firm _____

Street _____

City _____ Zone ____ State _____

Processed only by nature!...

Offered only by Norton!...



A "natural" for many barrel-finishing applications. The new Tumblex "N" abrasive, offered exclusively by Norton comes in sizes ranging from 3/16" by 3/8" to 1¾" by 2½".

NEW TUMBLEX "N" TUMBLING ABRASIVE

Natural abrasive brings value-adding, cost-cutting "TOUCH of GOLD" advantages to barrel-finishing

Tumblex "N" Abrasive is Nature's own tumbling abrasive. Carefully selected and graded by Norton, it opens up new possibilities for barrel-finishing applications such as light deburring, breaking sharp edges, polishing and burnishing and other operations where little actual cut is required. It is especially suited for work on die castings.

Tumblex "N" has proved particularly valuable in bringing out the most desirable color of the finished part. Metals on which it has proved its ability to give an excellent finish include zinc, brass, copper, aluminum and various forms of steel, including stainless.

Its rounded, uniform shape and very low breakdown ratio permit longer cycles and reduce the need of rescreening.

Another big Tumblex "N" advantage is extremely uniform cutting action. This assures the same uniform finishing in load after load. Also, it enables close regulation of cut; for example, by adding measured quantities of loose abrasive grain to Tumblex "N" you can speed up the rate of cut with little effect on the life of this natural abrasive. Exact formulas for best results in job or production tumbling are easily worked out.

Norton customers who have tested Tumblex "N" Abrasive report:

- *"Very good luster with no noticeable wear."*
- *"Fine performance. Very little breakdown. Reordering 700 pounds of sizes 2½T and 3½T."*
- *"Color O.K. on both zinc and brass."*
- *"Very long life. Gave excellent color on stainless steel."*
- *"A good polishing stone on aluminum."*

Send Your Work Samples

Let us demonstrate in our newly enlarged Sample Processing Department how Tumblex "N" Abrasive can give the value-adding "Touch of Gold" to your product quality and cut your barrel-finishing time and costs. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. G-303

NORTON

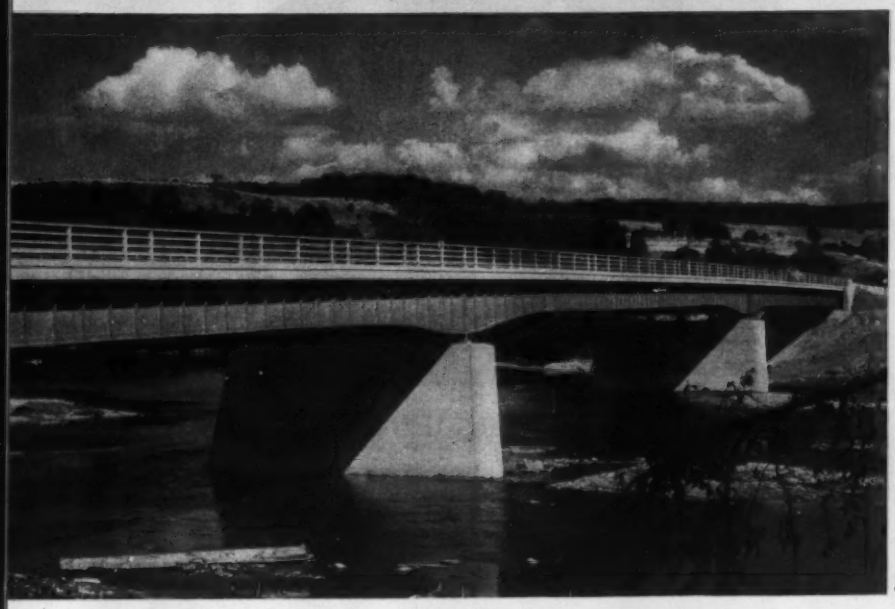
ABRASIVES

Making better products... to make your products better

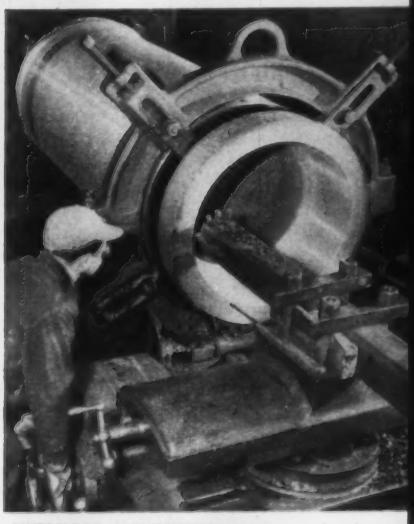
NORTON COMPANY
Abrasives • Grinding Wheels
Grinding Machines • Refractories

BEHR-MANNING Division
Coated Abrasives • Sharpening Stones
Pressure-Sensitive Tapes

BARIUM STEEL—active in America's growth

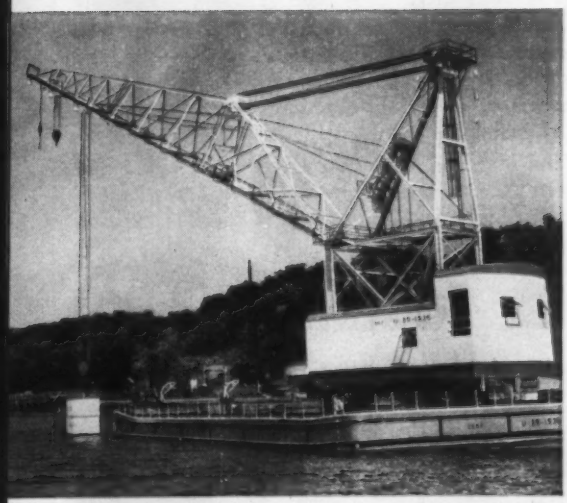


HIGHWAY CONSTRUCTION won't be slowed down by waterways as long as Barium's Phoenix Bridge Company fabricates steel and builds bridges. This handsome 500 foot, 900-ton continuous deck plate girder highway bridge, was built by Phoenix for the New York State Department of Public Works. It spans the Susquehanna River at Port Byron, N. Y.



CHEMICAL INDUSTRIES take advantage of the alert management thinking that has built Barium from 1 to 12 soundly diversified companies in ten short years. Here at Barium's Industrial Forge & Steel Inc., they're rough machining a 7900 lb. carbon steel forged sleeve for a leading chemical concern.

PROCESS PLANT builders shop at Barium, too. This large Gas Scrubber Separater unit (at left) was fabricated by the Plate Division of Barium's Phoenix Iron & Steel Company. Too big to go by railroad, a special truck rig delivered it to the job site at Farrel, Pa.



ARMED FORCES have learned what we mean by Barium's integrated operations. Though the Air Forces' biggest (50-ton design capacity) floating crane bears the nameplate of Barium's Wiley Manufacturing Co., four separate Barium companies pooled talents to produce it. Just one more chapter in "The Barium Story"—complete product listing is in Thomas Register, Section A to Z. 6.1

AUTOMOBILE gears, shafts and shifters are pounded out on hammers at Barium's Globe Forge, Inc. Automotive springs, fasteners and stampings come from other Barium companies. For more facts on Barium, write Barium Steel Corporation, 25 Broad Street, New York 4, N. Y.

STEEL PRODUCERS

Phoenix Iron & Steel Co. (Plate Div.; Structural Div.; Steel Tube Div.; Blast Furnace Div.)

STEEL FABRICATORS & PROCESSORS

Phoenix Bridge Company • Industrial Forge & Steel, Inc. • Globe Forge, Inc. • The Geometric Stamping Company

12 INTEGRATED COMPANIES

BARIUM STEEL CORPORATION

WORKING IN STEEL, ALUMINUM, MAGNESIUM, FIBERGLASS

MANUFACTURERS OF END PRODUCTS

Clyde Iron Works, Inc. • Erie Bolt and Nut Company • Bayonne Bolt Corporation • The Cuyahoga Spring Company • Jacobs Aircraft Engine Company • Wiley Manufacturing Company

LIGHTWEIGHT METAL AND PLASTICS

East Coast Aeronautics, Inc.

"One of the best money-making tools in our shop"

Forming cylindrical sections 8' 0" long, 5' 0" diameter from ⅜" steel plate.

With a Steelweld Press in your shop, you can handle almost any kind of a metal-forming job put up to you. Large heavy cylinders for buckets, drums, boilers, etc., are easily formed with standard bending dies.

You will find Steelweld Presses extremely versatile machines. With various jigs, dies and tools available, and others that can be developed for special purposes, a wide range of work can be performed on steel, aluminum, and the many alloy metals.

The opinions of many owners can be summed up in this statement of one: "A mistake that we didn't buy it years ago. One of the best money-making tools in our shop."

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

7823 East 281st Street, Wickliffe, Ohio

STEELWELD

BENDING PRESSES

BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

Everybody's talking about...
the new
"WB" BRAKES
by EC&M
Now 100% Lubricated
for Longer Life
E&M
6 new sizes of "WB" Brakes for
AC and DC motors meet these
AISE-NEMA Standards
Mounting Dimensions
Wheel Diameters
Torque Ratings

these improvements
EASIER TO MAINTAIN

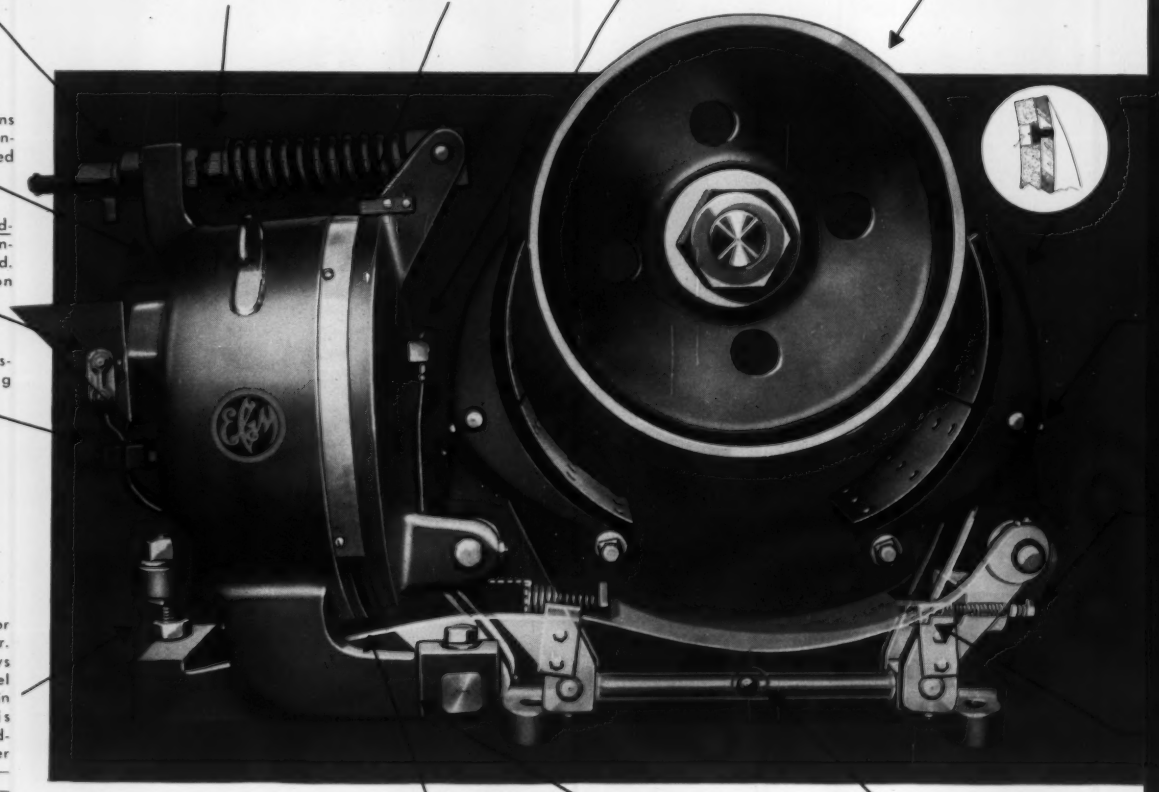
Manual release is standard on all sizes of these AISE-NEMA WB Brakes.

Bronze adjusting-nut on torque-spring rod has fine pitch threads for easier and closer adjustment.

Armature air-gap indicator shows visually when adjustment is needed to compensate for brake-lining wear.

100%-lubricated forces dirt out, all bearings alemite-lubricated.

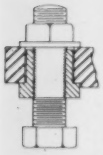
ECAMITE wheels are furnished as standard on all "WB" Brakes.



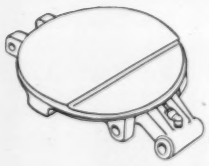
Magnet-case remains stationary and contains unit, armored coil.

Coil leads with solderless connectors under protective shield. Conduit connection box is optional.

Cable clamps for customer's incoming leads.



Single adjustment for brake lining wear. Adjusting-nut screws into stainless steel threaded bushing in magnet-case. This gives longer threaded path for greater bearing surface — easier adjustment — only single wrench required. Nut on top locks against machined surface.



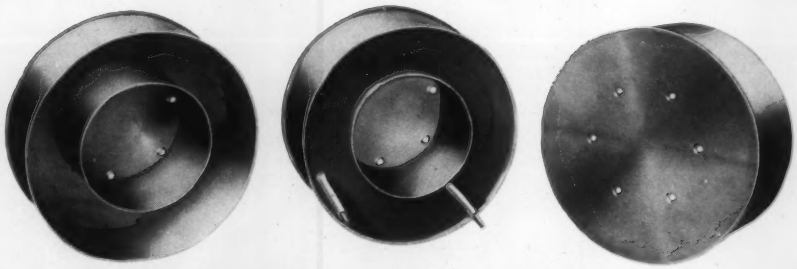
Armature-face recessed at bottom allows dust to fall free — prevents clogging.

Magnet-case removable as a unit without disturbing remainder of brake.

Connecting lever remains below the brake wheel and is of tubular construction. Alemite fitting (on both sides) permits greasing four bearings from this one fitting.

ARMORED COIL CONSTRUCTION

WB Brake coils . . . protected by a steel enclosure, permit quick coil removal. After vacuum-impregnating with No. 371 polymerizing varnish and baking, coil is sealed in its protective enclosure with No. 372 Epoxy compound. This compound does not soften, but holds the coil securely against movement.



make the new "WB" brakes

. . . LONGER LASTING!

Molded brake blocks, riveted securely in place, are made from an improved material having a higher coefficient of friction. Permissible wear is ⅛" on the smallest size to 7/16" on the largest size.

Fixed bearing-pins locked with stainless steel setscrews reduce number of lubrication points.

This adjustment equalizes clearance of both shoes.

Hardened steel camrails retain clearance between shoes and wheel with brake released.

These new EC&M "WB" Brakes are built to AISE-NEMA standards. The basic principles which made "WB" Brakes the outstanding brake for heavy mill service have not been changed. The new design includes several improvements making EC&M "WB" Brakes even longer lasting and easier to maintain. These improvements are:

1 — 100% lubrication . . . for longer life, for freedom of operation by forcing dirt out of bearing surfaces.

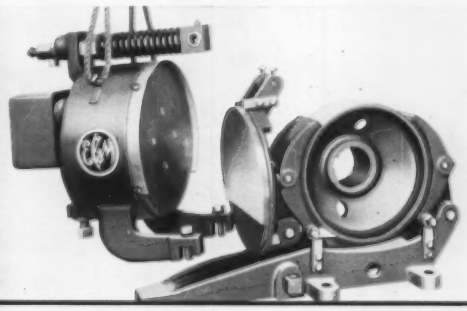
2 — Recessed armature . . . eliminating pocket for dust collection.

3 — Single wrench adjustment for brake-block wear . . . restores air-gap to normal, adjusting-nut has fine pitched threads.

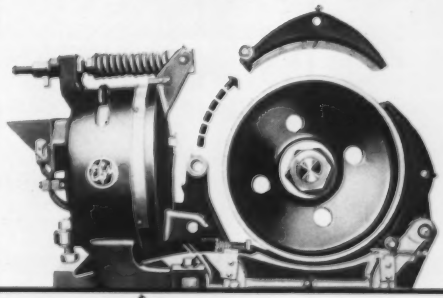
Remaining unchanged because of their proven acceptance and time-saving advantages are these features:-nothing over the brake wheel, manual release, single adjustment for lining wear, stationary magnet and sturdy 2-shoe construction.

These new EC&M "WB" Brakes are available with series and shunt coils for d-c service, and are supplied for rectifier-operation on a-c circuits. For LONG-LIFE Brakes, specify "WB" Brakes by EC&M.

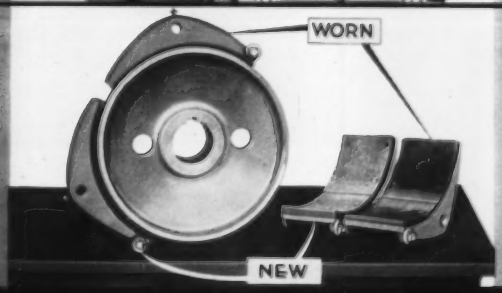
SIMPLIFIED MAGNET REMOVAL
Maintenance men appreciate the time-saving construction that makes coil changing a simple procedure. The magnet case can be swung away without disturbing the remainder of the brake. A coil can be replaced quickly or a complete new magnet installed in a matter of minutes.

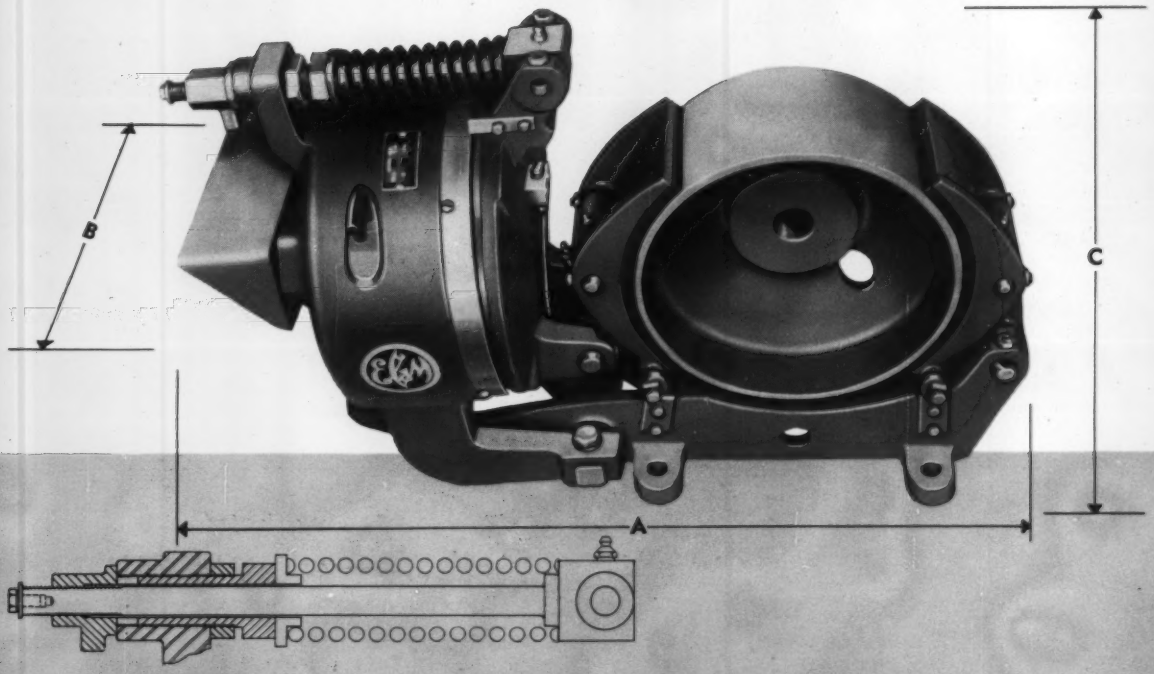


SHOES AND LINERS EASILY REMOVED
With shoe bearing-pins slipped out, shoes slide up on top of the wheel easily to permit worn brake-linings to be replaced. This has been standard construction with "WB" Brakes for years.



ACCURATELY FORMED RENEWABLE BRAKE BLOCKS
WB Brake Blocks retain their frictional quality longer than any other braking material. They are accurately formed so that new blocks fit the arc of the wheel and shoe surface as accurately as the original block.

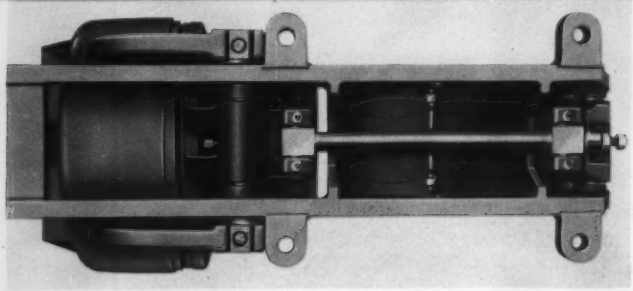




NEW OPERATING SPRING CONSTRUCTION

Operating spring force transmitted directly to magnet armature. Guide rod, threaded only at outer end under manual release (bronze) nut, is under tension only when brake is manually released. Brake torque is adjustable by a bronze nut threaded into the magnet-lug. Fine pitch threads permit closer and easier torque-adjustment. A jam-nut locks the setting.

Brake Size (Wheel Diameter)	600-Series Motor size	BRAKE TORQUE RATINGS in Lbs. Ft.				Approximate Outline Dimensions in Inches		
		Series-Wound Brakes		Shunt-Wound Brakes				
		½ hour Rating	1-hour Rating	1-hour Rating	Continuous Rating	Length "A"	Width "B"	Height "C"
8" WB	402 602	100	65	100	75	24¼	9¼	13½
10" WB	603 604	200	130	200	150	27¼	10¾	16⅜
13" WB	606 608	550	365	550	400	34¾	13¼	20⅛
16" WB	610	1000	650	1000	750	38⅛	15½	22¾
19" WB	612 614	2000	1300	2000	1500	45¾	18½	26½
23" WB	616 618	4000	2600	4000	3000	55⅜	21⅞	31⅝



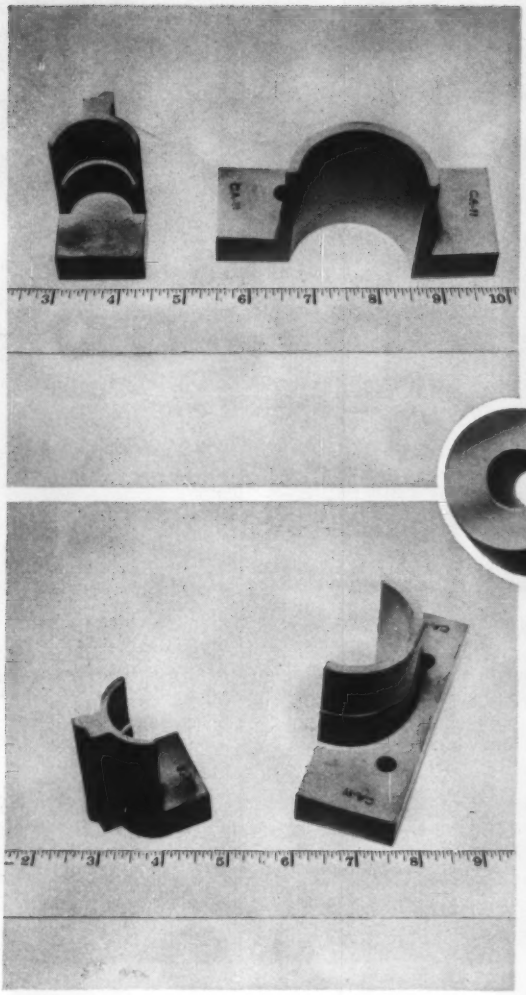
Bottom view of new "WB" Brake showing tubular connecting lever for lubricating bearings at both ends from one alemite-fitting. The brake can be mounted either right or left hand, and the lubrication may be applied from either side through an opening in the brake frame.

EC&M "WB" Brakes have long been known for their fast response in releasing and setting. The fundamental short-stroke characteristic of these new "WB" Brakes which gives quick action has been proved on crane-hoists and hard-worked mill applications. Unit pressure between brake shoe and wheel remains at substantially the same low value as in the previous WB Brakes. These new EC&M "WB" Brakes, built to the AISE-NEMA Standards, are designed to give smoother operation . . . safer stops . . . and less maintenance. Specify EC&M Bulletin 1000 Type WB Brakes.

THE ELECTRIC CONTROLLER & MFG. CO.

A Division of the Square D Company

4498 LEE ROAD • CLEVELAND 28, OHIO



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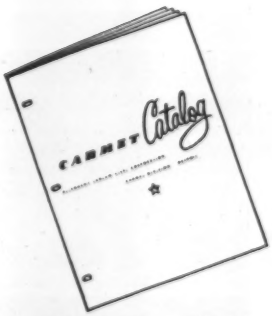
these Blanks are preformed to a Finishing Allowance of .018"-.022" per side



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CARMET CATALOG

Just out . . . 32 well-illustrated pages, containing data on all Carmet grades, and on Carmet blanks, tools, die sections, punches, draw die inserts, etc.; also special preforming to order.
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ADDRESS DEPT S-741

These tungsten carbide die sections are of Carmet CA-11, a special grade developed expressly for punches, dies, and other heavy shock applications where wear and abrasion resistance are required.

These blanks have a span of 1.315" with a wall thickness of only .046", but they were easily produced to close tolerances by AL's precision preform methods. All surfaces are clean, smooth and free from defects, requiring only a minimum amount of grinding to final dimensions.

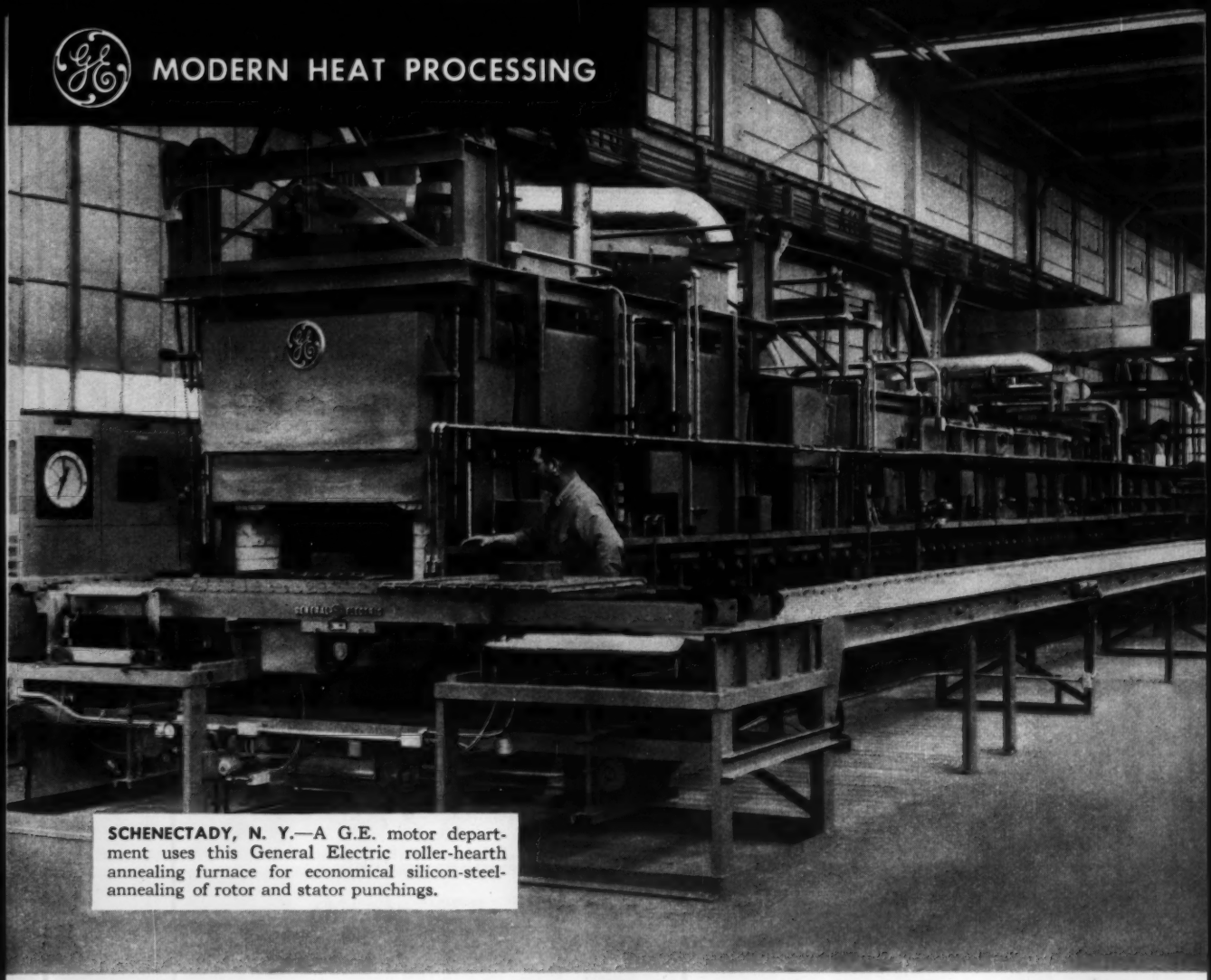
Carmet carbides can be accurately produced to practically any shape or size your designs may require, and can be supplied preformed as desired. Typical highly successful applications include inserts for drawing, heading, extruding and blanking dies; gauge and wear parts; pins; bushings; etc.

Find out, TODAY, how you can cut costs with preformed Carmet. Write or call *Allegheny Ludlum Steel Corporation, Carmet Division, Wanda and Jarvis Avenues, Detroit 20, Mich.*

For ALL your CARBIDE needs, call
Allegheny Ludlum
W&D 8390

AL® FINE TOOL STEELS SINCE 1854

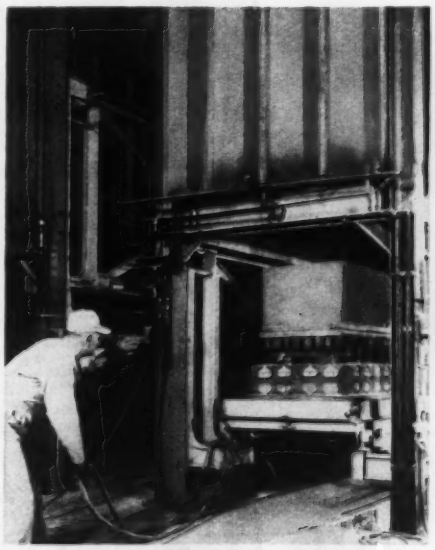
MODERN HEAT PROCESSING



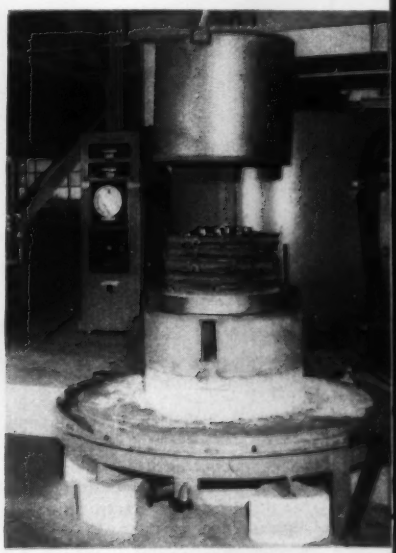
SCHENECTADY, N. Y.—A G.E. motor department uses this General Electric roller-hearth annealing furnace for economical silicon-steel-annealing of rotor and stator punchings.

WIDE VARIETY OF G-E ANNEALING FURNACES NOW LETS YOU ANNEAL SILICON STEEL RIGHT IN YOUR OWN PLANT

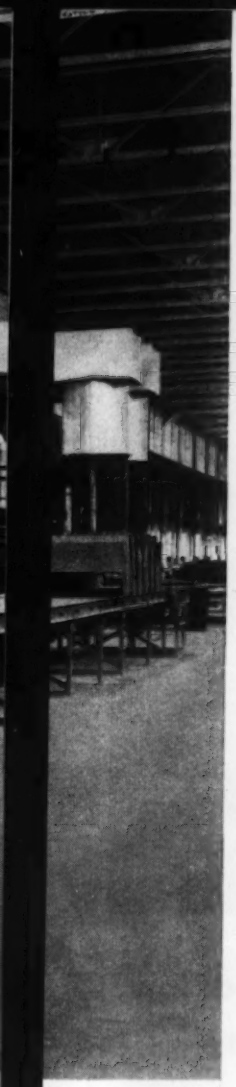
Take a tip from General Electric, user of about 25% of the country's production of silicon steel—you can cut costs by annealing your own silicon steel. There's a General Electric silicon steel annealing furnace for nearly every type of annealing application—large or small. For example, the furnaces at right are located in different G.E. plants, each handling a different size silicon-steel-annealing job—*economically*.



G-E ELEVATOR FURNACE at Rome, Ga. plant is used for high temperature annealing of transformer cores—furnace fits in minimum space.



G-E BELL FURNACE, Waynesboro, Va. Low-production unit anneals machine parts at low cost.



PROBLEM:

Annealing silicon steel in an automated setup

SOLUTION:

G-E roller hearth furnace anneals stator punchings and weld in one pass, cuts costs

A General Electric roller hearth furnace in the new automated production line for one of G.E.'s motor departments anneals 1500 pounds of rotor and stator punchings an hour—helps produce a Tri-Clad* 55 motor every 2½ minutes. The stator punchings and weld are annealed at the same time. This eliminates the cost and time involved in making two passes through the furnace. Only one man is needed to oversee the complete annealing operation.

IN ADDITION TO G-E furnace quality, here are the advantages you receive when you deal with G.E. on silicon steel annealing:

(1) TECHNICAL KNOWLEDGE—G-E research helped pioneer the development of silicon steel for improved magnetic properties.

(2) EXPERIENCED USER—G.E. uses about 25% of the total production of silicon steel.

(3) EXPERIENCED BUILDER—G.E. offers a complete line of furnace and control equipment for your silicon steel annealing.

(4) APPLICATION HELP—plus installation supervision—assure you of the most efficient furnace installation.

(5) MAINTENANCE SERVICE—Nearly 200 G-E service shops, located throughout the country, are ready to help you 24 hours a day.

ASK FOR THE SERVICES of your local G-E Apparatus Sales Representative in assessing the economies of annealing silicon steel in your plant. Just call your nearby General Electric Apparatus Sales Office.

*Reg. trademark of General Electric Company.

GENERAL ELECTRIC

G-E MESH-BELT FURNACE located at Ft. Wayne, Ind. plant blue-anneals rotor laminations. Ideal for medium production, the mesh-belt furnace is flexible for use over a wide range of temperatures and speed.

FREE PROCESS BULLETINS

Please send me the Modern Heat Processing bulletins I have checked below.

- ☐ Protective Atmospheres, GEA-5907
- ☐ Annealing Malleable Iron, GEA-5797
- ☐ Furnace and Induction Brazing, GEA-5889
- ☐ Wire Enameling, GEA-6179
- ☐ Heat-treating Aluminum, GEA-5912
- ☐ Forging with Induction Heat, GEA-5983

General Electric Company
Apparatus Sales Division, Section H 721-4
Schenectady 5, New York

Name.....

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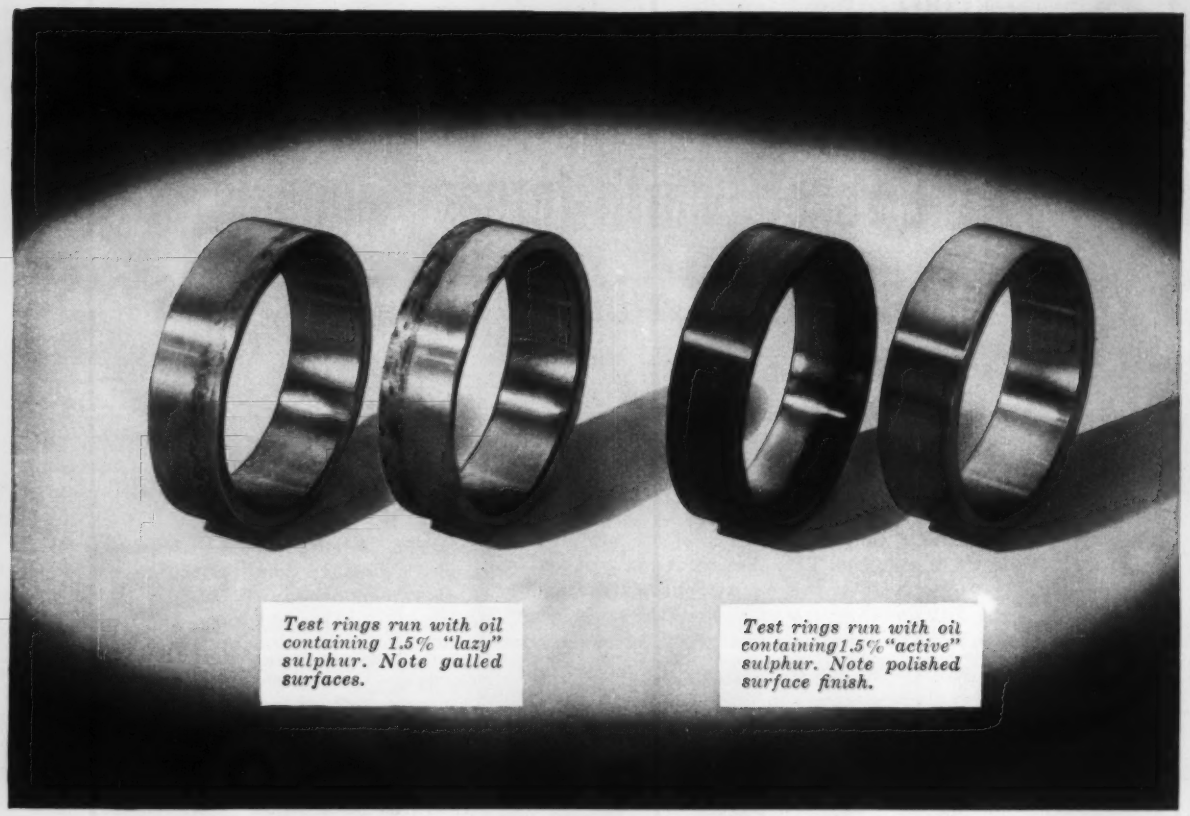
City..... State.....



Test rings run with oil containing 1.5% "lazy" sulphur. Note galled surfaces.

Test rings run with oil containing 1.5% "active" sulphur. Note polished surface finish.

Only ACTIVE Sulphur Provides Fluid Lubrication Under Extreme Pressures

This comparative test proves it! Both tests were run on an SAE Lubricant Tester using two oils with the same percentage of sulphur. The specifications were similar—but look at the results!

The set of rings on the left were run with an oil containing "lazy" sulphur that did not provide the necessary anti-weld qualities. Under the heavy loads present in the test, the rings quickly galled and seized. The pair on the right were run with an oil containing "active" sulphur, the *only* type of sulphur that will prevent galling or seizure. It is performance that counts, not specifications.

"Active" sulphur in a cutting oil, readily reacts with the metal surfaces of the tool, chip and workpiece to produce metallic sulphide films that become fluid lubricants when sufficient heat is generated, and provide lubrication under the high temperatures that exist in the cutting orbit.

Stuart Oil Company's Shop Note Book, Bulletin S-2, contains further information on how to select a sulphurized cutting oil. Write for your copy today, and ask to have "the Man in the Barrel", your Stuart Representative, call too. He will help you select the cutting fluid that will provide the very best results under the conditions you will subject it to.

D. A. STUART OIL COMPANY, LTD.
2735-37 S. Troy St., Chicago 23, Ill.

More than a "Coolant" is Needed

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Plants in: Chicago, Detroit, Cleveland, Hartford, and Toronto, Ontario.

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TWO WAYS...with Master Unibrakes

STOP-HOLD—Master Type M Magnetic Unibrake Motors. For quick, controlled stopping—especially when you want to hold the load. Spring-setting magnetic release brakes of the friction disc type combine with motor in a compact, integral unit. Sizes—⅛ to 150 H.P.

ROLLING STOP—Master Type D Dynamic Unibrake Motors. Braking is obtained with a unique, patented brake winding superimposed on the stator winding. Simple, compact, with no DC current required, the brake has no moving parts. There is nothing to wear or adjust—braking torque repeats consistently. Particularly recommended for automatic applications which do not require static holding. Sizes up to 30 H.P.

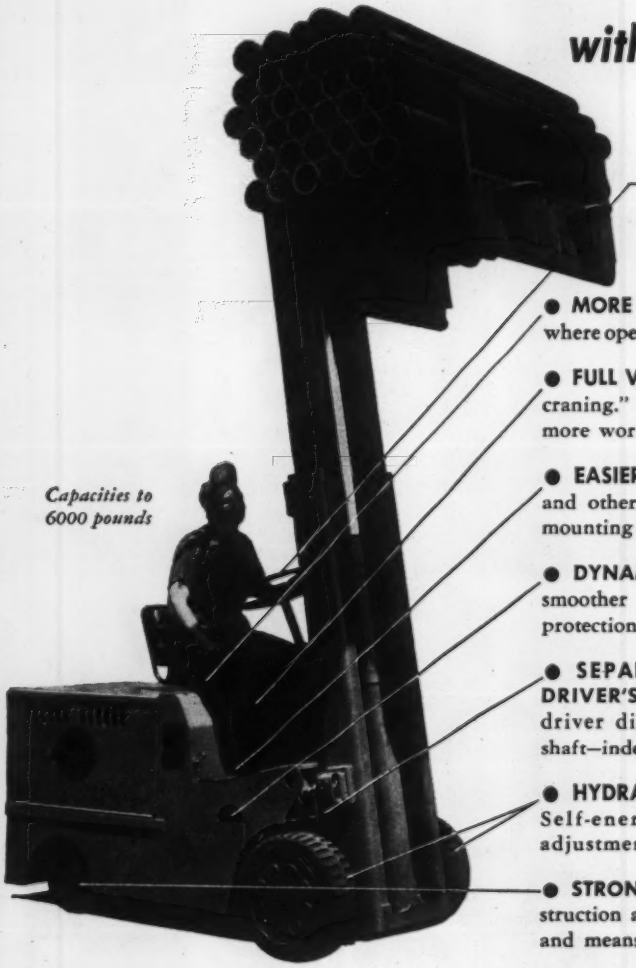
MASTER GEARMOTORS and variable speed drives can be supplied with integrated Unibrakes too. See Master for the perfect power drive for you.

THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO

MASTER UNIBRAKE MOTORS

BAKER announces a NEW LINE of BATTERY-POWERED FORK TRUCKS

with many added features...



Capacities to 6000 pounds

- **EASIER TO STEER**—Less weight on steering axle, combined with automotive type steer, provides finger-tip control even on largest models.
- **MORE CONVENIENT CONTROLS**—Located right where operator wants them. Easy and simple to actuate.
- **FULL VISIBILITY**—No cowl, no console—no "neck craning." Greater safety, less operator fatigue, more work.
- **EASIER TO GET ON OR OFF**—Absence of cowl and other obstructions means easier and faster mounting and dismounting.
- **DYNAMIC BRAKING**—Greater safety on ramps, smoother stops, less wear on brake lining, greater protection for truck and load.
- **SEPARATE PARKING BRAKE LINKED TO DRIVER'S SEAT.** Automatically holds truck when driver dismounts—even on incline. On armature shaft—independent of wheel brakes.
- **HYDRAULIC WHEEL BRAKES**—Finest available. Self-energizing, self-equalizing. Single point adjustment.
- **STRONGER STEERING AXLE**—Double-yoke construction and rubber mounting reduces road shocks and means smoother riding for operator and load.

The new Baker FT line of electric fork trucks is engineered for maximum efficiency, operating convenience and economy, with minimum maintenance and down time. Reliable Timken axle is specially designed for industrial truck use. Less overhang, lighter weight, greater stability, shorter turning radius, more forward tilt and lower silhouette are advantages gained in this new design.

Every Baker "FT" has a *full one year warranty*—proof of our confidence in our workmanship and quality. Elements that have built the outstanding reputation for previous Baker electric trucks have been retained, and new features added. Ideal placement of hydraulic valves makes it simple to add additional valves for hydraulic attachments. All service points are conveniently accessible.

Write for complete information:

Baker® handling equipment

THE BAKER-RAULANG COMPANY
1259 WEST 80th STREET • CLEVELAND 2, OHIO

A subsidiary of Otis Elevator Company

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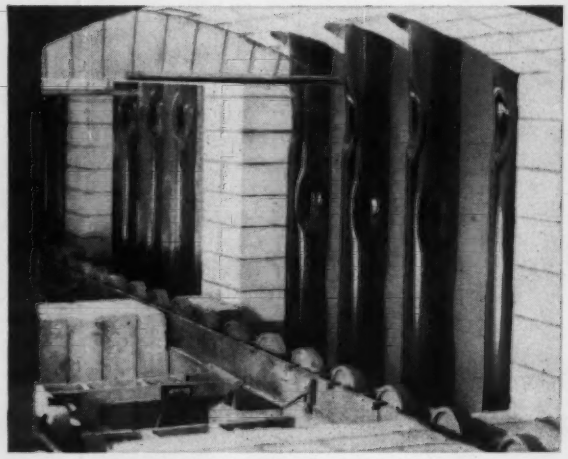
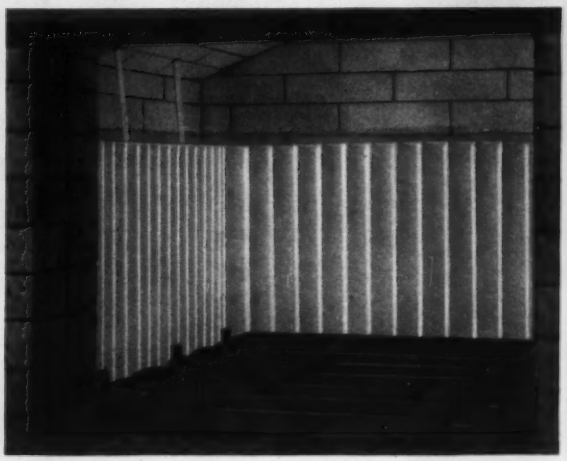
Welds readily . . . excellent for soldering and brazing

Whatever your source of heat...

LINDBERG HEAT TREATING FURNACES OFFER THESE EXCLUSIVE ADVANTAGES





. . . IN THE GAS-FIRED FURNACE
NEW LINDBERG VERTICAL RADIANT TUBE

Because of its revolutionary design, this tube provides a new level of gas-fired furnace performance. The secret lies in the new Lindberg tube's "dimples." The tube carries a central stream of mixed air-and-gas surrounded by a cylindrical stream of air alone. Combustion occurs in the area between these two streams. The "dimples" create eddies accelerating combustion and maintaining even temperatures along the entire tube.

This Lindberg tube will operate at maximum efficiency for a longer period of time. The special protective coating gives greatest possible resistance to carbon penetration. Vertical position eliminates soot deposit and resultant temperature increases at points of sooting.

Tubes are 59 inches long, weigh only 29 pounds, changeable in a few minutes. No costly furnace shutdowns nor high labor and material cost for tube changes.

. . . IN THE ELECTRIC FURNACE
NEW LINDBERG CORRTHERM ELEMENT

CORRTHERM, Lindberg's radically advanced new electric heating element offers advantages never before available for heat treating furnaces. With this new element carburizing and carbonitriding with electricity becomes practical, efficient and economical. Ideal, too, in other types of Lindberg electric furnaces.

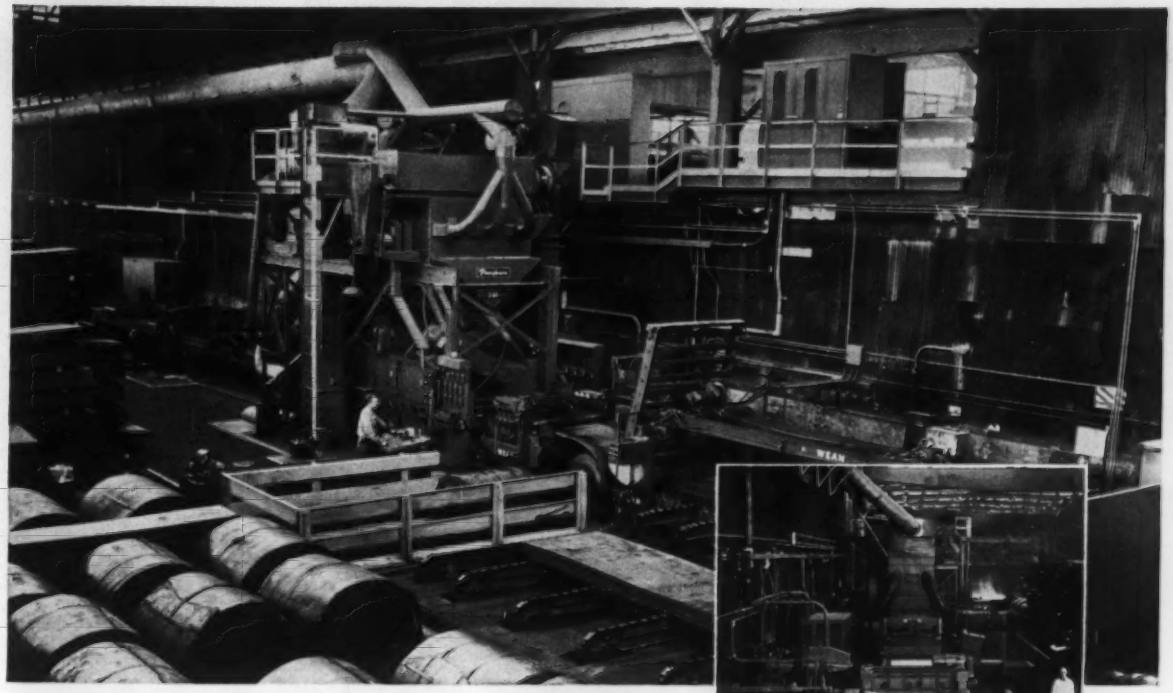
The outstanding feature of the CORRTHERM element is the extremely low voltage at which it operates. Consequently, leakage through carbon saturation and shock or short hazards are eliminated. Elements also act as baffles to direct circulation of convection streams.

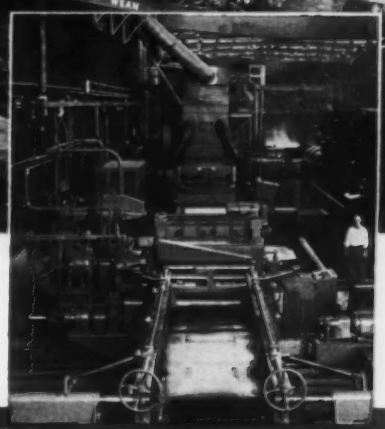
CORRTHERM elements are practically indestructible. Work load or operator's charging tool can't hurt them. Watts density is at all time low. Easily installed or replaced, too, as element merely hangs in furnace and no complicated mountings are required.

Lindberg Field representatives in 21 cities are ready to show you how Lindberg furnaces with these revolutionary new elements can improve your heat treating process. You'll find your Lindberg representative's name in the classified section of the phone book or write us direct.

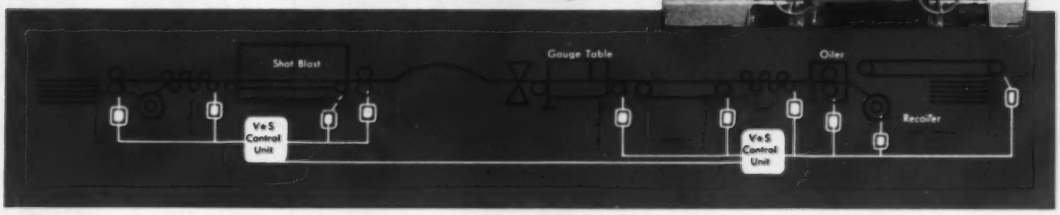
LINDBERG FURNACES

LINDBERG ENGINEERING COMPANY
2441 W. Hubbard Street • Chicago 12, Illinois





CUTS AND CLEANS UP TO 50 TONS AN HOUR— *Automatically*



It's one of the world's first automotive steel cut-up lines, owned by Parish Pressed Steel Div.—Dana Corp., Reading, Pa. This line cleans, cuts-to-length, lubricates, levels, and coils or stacks up to 50 tons of hot rolled steel an hour.

The line is made up of several separate machines —an uncoiler, a shear, a shot-blast cleaning machine, an unpiler, a lubricator, and a coil winder or stacker —all joined by a conveyor system containing pinch rolls and leveling rolls. Yet the whole line operates as one giant machine, thanks to perfect coordination provided by Reliance V★S Drives.

V★S Drives furnish an unusual flexibility to the Parish line too. Sheet speeds can be varied from 40 feet per minute up to 160 fpm. to accommodate various thicknesses and widths. From the master control, and the three supporting control stations, any one operation or combinations of operations can be eliminated from the line. Thus the line is not limited to just one set series of functions.

This application of Reliance Motors and Drives —to control tension, to synchronize operations, to regulate speed—is typical of the jobs done by the Reliance Applied Engineering Department.

L-1511

If you would like further information on the application of V★S Drives in your plant write:

RELIANCE V★S DRIVE®

RELIANCE ELECTRIC AND ENGINEERING CO.

Cleveland 10, Ohio • Offices in Principal Cities

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ALL THESE MACHINES BUILT INTO ONE!

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Instead of giving space to a number of machines to do the above operations, you get all on a single base with the "Buffalo" Universal Iron Worker. You save space. You save conveying work from machine to machine. You can do multiple operations without tool changes—up to three operations simultaneously. The *only* machines available with built-in notcher and coper.

Rugged electrically-welded steel plate frame, not cast iron. One-shot lubrication in most models. Handy hold-downs for fast, accurate work. 5 models to choose from. If you do structural or plate work in your shop, you'll do it faster and cheaper with a U.I.W. Write for Bulletin 360 today or check with your nearby "Buffalo" Machine Tool Dealer.

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Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

DRILLING • PUNCHING • SHEARING • BENDING

Towers designed and fabricated by American Bridge Division of United States Steel for Florida Power Corporation. Erected by Southeastern Utilities Service Company, Miami, Fla.

26 tons of weight saved by USS MAN-TEN Steel saves $7,200 in erection costs

Because power transmission towers are frequently installed in locations far removed from regular means of transportation, every pound saved reduces shipment and erection costs.

The four towers crossing Old Tampa Bay from the Florida Power Corporation's Higgins plant forcibly illustrate this fact. These towers, built 198 ft. high to provide a 100 ft. clearance over mean low water, had to be designed to resist hurricane force winds of 135 mph, with an overload capacity factor of 1.25.

The high strength required was readily obtained by using USS MAN-TEN Steel rather than plain carbon steel in the tower legs. At the same time, because of MAN-TEN's high yield point of 50,000 psi, it was possible to reduce weight of legs by 26 tons. This considerable saving in steel tonnage reduced the cost of the towers even though USS MAN-TEN Steel costs a little more.

The big saving, however, was in cost of erection.

There were two different rates involved; one for erection over water and one for erection on land. 6½ tons were trimmed from each of the three towers erected over water, resulting in a $6,000 saving. The tower erected on land weighed 6 tons less, providing an additional $1,200 saving—or a total erection cost saving of $7,200.

If you are looking for construction that will save money for you by reducing weight, prolonging life and minimizing maintenance—at little or no increase in first cost—find out more about USS High Strength Steels—USS MAN-TEN, USS COR-TEN and USS TRI-TEN. You'll find our 174-page "Design Manual for High Strength Steels" extremely useful in applying these steels. For free copy write—on your company letterhead—to United States Steel Corp., Room 5221, 525 William Penn Place, Pittsburgh 30, Pa.

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USS

6-872

UNITED STATES STEEL

Tuffy® SLING NEWS

Vol. 1 — Published Monthly in Leading American Trade Magazines by Union Wire Rope Corp. — No. 4

HOW NEW FERRULE WORKS IS SHOWN IN FREE SLING BOOK

Ferrule Story, Facts on Fittings and Slings In Useful New Edition

This new and enlarged edition of the Tuffy Sling Handbook is an absolute "must" for plant and safety engineers, purchasing agents and shop foremen—everyone who uses, buys, or supervises work with slings. We distributed more than 85,000 copies of the first edition, and the demand for this new, completely revised edition is going to be even greater.

Featured in our new Sling Handbook is the new Tuffy streamlined metal ferrule pressed on the tucked eye splice. This new Tuffy Sling Handbook lists nearly a dozen new fittings—sling bridles, slip-on thimbles, safety hooks, sling saddles, horizontal clamps, and many others. It tells you all about the enlarged line of factory-fitted Tuffy Slings. It contains a complete rigger's manual, proof-tested rated working loads and specifications on all Tuffy Slings.

It's Yours Free, but our supply is going fast. So mail the coupon now for your copy of this valuable Tuffy Sling Handbook.

SEE DISTRIBUTOR FOR TUFFY SLINGS AND HOIST LINES

He can save you the time and trouble of carrying a full inventory. Tell him your normal requirements and he will keep matching stock of Tuffy Slings and Tuffy Hoist lines for fast delivery. Your Tuffy distributor can supply longer sling service life—bigger value for your money.

New Tuffy Ferrule Exclusive Feature at No Extra Cost

Union Wire Rope developed the new Tuffy Sling ferrule to make Tuffy Slings easier, safer, and faster to handle. It took extensive research and proof testing to improve upon the full length hand splicing of Tuffy Sling eyes which have withstood the test of time. Now equal or greater strength is attained with ferrule splice and the hazards of protruding tuck terminals are eliminated. Yet it costs you nothing extra for this exclusive feature.

Strength of Tuffy Fabric Now Equaled in Splice

First, the 9-part machine braided Tuffy Fabric of the sling eye is tuck-spliced together. Then the new Tuffy steel ferrule is slipped around the splice. Under terrific pressure, the metal of the ferrule (see cross section of splice and ferrule above) virtually flows into the interstices of the machine braided fabric. Every Tuffy sling is given strength at the eye splice equal to the superior strength of the machine braided fabric. The swaging of the ferrule at the ends makes them smooth, so they can't injure hands or catch on loads.

union Wire Rope corporation

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand.

2160 Manchester Avenue, Kansas City 26, Missouri

MY NAME _____ TITLE _____

COMPANY NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____ 15

TIPS FROM A ROLL MAKER'S NOTEBOOK

MACKINTOSH-HEMPHILL DIVISION, E. W. BLISS COMPANY, Pittsburgh 3, Pennsylvania

Cast mill rolls • Johnston cinder pots • rotary tube straighteners • end-thrust bearings • heavy-duty lathes • steel and special alloy castings

Choosing rolls for slabbing and blooming mills

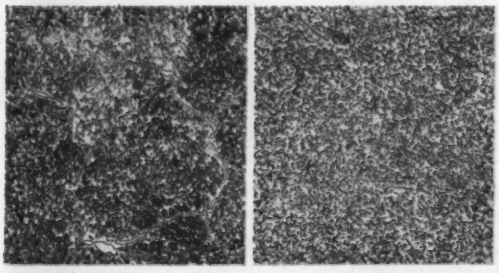
Cast steel rolls for blooming and slabbing mills must combine good resistance to fire cracking with the strength necessary to stand the severe stresses developed by these mills.

Other considerations that affect the choice of rolls include severity of the service and the method of roll cooling. Variations like these can mean good service from inexpensive rolls in one mill while in another the only practical solution lies in costlier, higher alloy rolls.

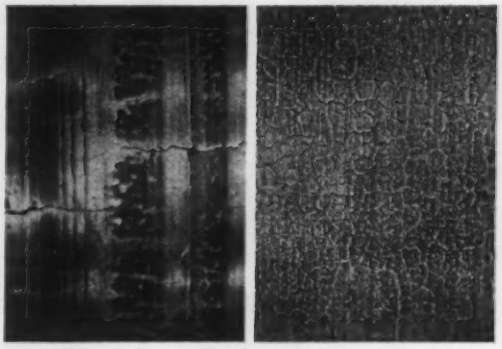
Two heat treatments – Heat treatment is used primarily to improve roll strength. However, heat treatment also affects resistance to fire cracking – metallurgists believe that there is a relationship between fire cracking and the elimination of the carbide network from the crystalline structure of cast steel.

Mack-Hemp has developed two heat treatments for blooming and slabbing rolls. The first is an air quench and draw, and develops maximum strength. It produces rolls with excellent resistance to the very severe localized concentration of stress that occurs each time the steel goes through a pass.

The second heat treatment, a double anneal, produces a spheroidized carbide structure with good strength and excellent resistance to fire cracking.



Carbide network (left) stands out clearly in specimen of roll with ordinary treament. Picral etch, 500 magnifications. Network in Midland Superalloy (right) has been almost completely destroyed by special Mack-Hemp heat treatment. Picral etch, 500 magnifications.



Severe fire cracking ended the service life of the slabbing roll whose surface is shown at the left. Surface of Midland Superalloy roll at right shows excellent fire cracking pattern (roll had reached worn-out diameter after more than 600,000 tons).

Three types of rolls – Both of these heat treatments are modifications of older practices, designed to decrease the amount of grain boundary carbide in the finished roll, thus improving fire cracking resistance. Either treatment can be supplied in the three grades of Mack-Hemp cast steel rolls recommended for slabbing and blooming mills:

Midland Superalloy, a nickel-chrome-moly roll especially developed for applications where fire cracking is a severe problem. There are cases on record where sets of Midland Superalloy rolls have rolled 700,000 tons and more before reaching worn-out diameters.

Technalloy, a chrome-moly roll that has thoroughly proved itself under standard operating conditions.

Technisteel, a carbon steel roll which gives good service at low initial cost under mild-to-average operating conditions.

Squeezing maximum tonnages from your mills... at minimum roll cost... is far easier when you enlist Mack-Hemp's aid. For help with your particular rolling problem, write us today.

MACKINTOSH-HEMPHILL

You get more tonnage from the rolls with the Striped Red Wabblers

Division of E. W. BLISS COMPANY
PRESSES, ROLLING MILLS, SPECIAL MACHINERY

CHAMBERSBURG
STEAM DROP HAMMERS

MODEL E

MODERN FORGING REQUIREMENTS DEMAND MODERN HAMMERS ·

Shown above is a 6000 lb. Model "E" Chambersburg Steam Drop Hammer forging 4" alloy steel valve bodies. A Chambersburg 200 ton Steel Side Trimming Press is used to complete the operation. The Chambersburg Model "E" Hammer pays its way through increased production and trouble-free service. Details of this modern hammer are in our Bulletin No. 55-L-4. If interested, write for a copy.

Trimming Forgings on Chambersburg Trimmer

CHAMBERSBURG ENGINEERING COMPANY · CHAMBERSBURG, PA.

P&H LOW-HYDROGEN ELECTRODES GIVE

Top Quality Welds at Lower Cost

—free report shows why

With P&H low-hydrogen electrodes, you can get top-quality welds at low cost on all high-alloy steels. Eliminate most of your costly rewelding, preheating, and defects by using P&H low-hydrogen electrodes. You can get P&H electrodes to match the heat treating properties of your metals. And P&H low-hydrogen rods cost much less than stainless steel rods.

Lower working temperatures are another advantage of P&H electrodes. Less preheating of metals means more comfort and less fatigue for operators, plus a big saving in time. Read how one large firm got high quality welds at low cost and gained a big sales advantage from P&H low-hydrogen electrodes. It's all in the impartial, certified report offered here, free.

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City _____ Zone _____ State _____

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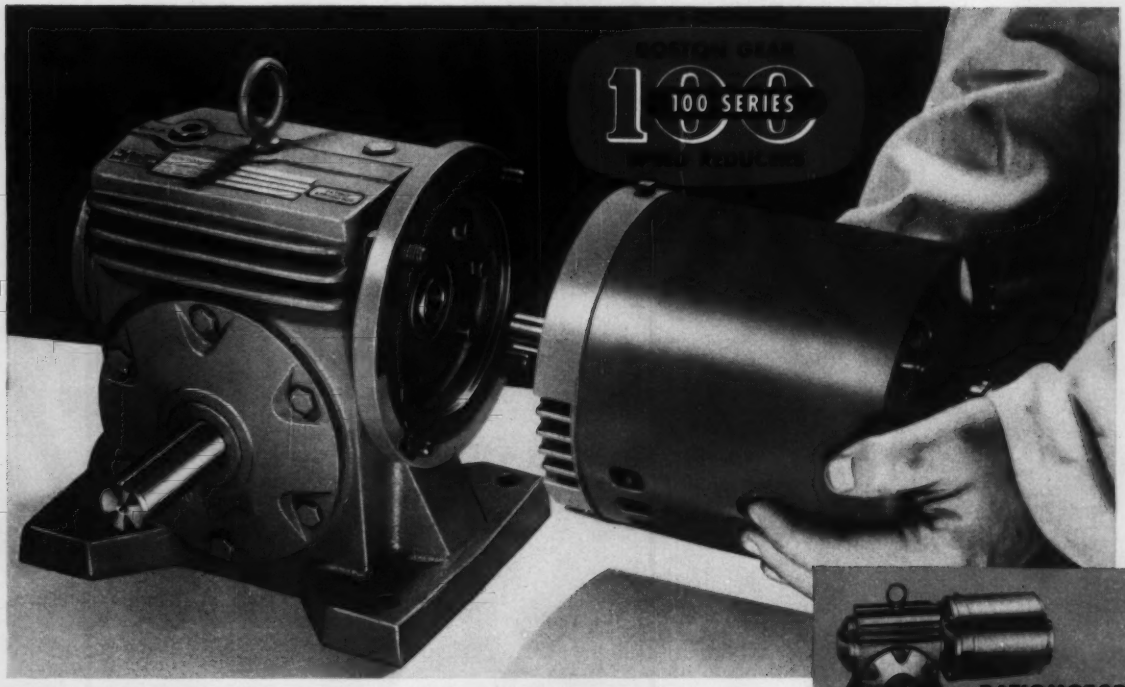
the P&H *Line*

P&H welding equipment is manufactured and sold in Canada by REGENT EQUIPMENT MANUFACTURING COMPANY LTD., 455 King Street West • Toronto, Ontario, Canada



No downtime for motor repairs!

New COST-SAVING "COMBINATION"

permits motor change in minutes
. . . continued operation with spare

The new 100 SERIES RATIOMOTOR combines a gear reduction unit and an easily detachable, standard end-mounted motor.

MOTOR CAN BE REMOVED and replaced in a few minutes, without disturbing the gear reduction unit. Saves maintenance time, preserves alignment, permits continued operation with spare motor.

ORIGINAL MOTOR CAN BE CHANGED When conditions require change to a motor of special characteristics (totally enclosed, explosion-proof, etc.) it can easily be attached in place of the original motor.

ANY MODEL NEEDED — FROM STOCK The 100 SERIES includes 1064 different *standardized stock* units for an unlimited range of applications . . . Reductors, for mechanical drives, as well as Ratiomotors and Flanged Reductors. All ratings are *certified* to be actual torque delivered, by Independent Laboratory tests.

A BOSTON GEAR FIELD ENGINEER will help you simplify planning, and put your product ahead in design. Your Boston Gear Distributor will arrange a call, or write: Boston Gear Works, 73 Hayward St., Quincy 71, Mass.

RATIOMOTORS
The complete power package, with motor.

SOLD WITH OR WITHOUT MOTOR

FLANGED REDUCTORS
The Ratiometer gear unit, supplied without motor. You buy and attach any motor you choose.

REDUCTORS
For mechanical drives, new 100 SERIES design saves space and weight. Housings are finned for improved cooling. Fan-cooling optional on larger sizes.

MAXIMUM HORSEPOWER PER DOLLAR
Certified
by Independent Laboratory tests

GET NEW CATALOG R-56
Lists models for any drive . . . horizontal or vertical—right angle or parallel—single or double reduction. Includes selection charts, engineering data.

1064 DIFFERENT UNITS
108 MODELS — FROM STOCK

Call your **BOSTON** *Gear* **DISTRIBUTOR**

PATENTS PENDING

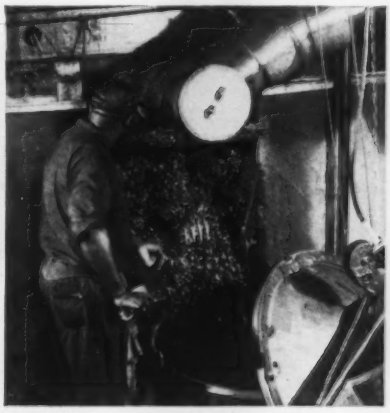
For nearest distributor, look under "GEARS" in the Yellow Section of your Telephone Directory.

55-BG-R-17A

steel turnings can be mighty troublesome

until they're reduced to this size

Feeding steel turnings to the Jeffrey crusher as they come from the machines.



From the crusher, the reduced metal now goes to the centrifugal oil separator.

Jeffrey bucket elevator carries scrap to storage for delivery to trucks.

You haul only one-third the volume of scrap, and it's much easier to handle after you put your metal turnings through a Jeffrey crusher. Scrap brings a better price and it is practical to spin the turnings to salvage the cutting oil that clings to it.

You save on labor, get more money for your scrap, and reclaim valuable coolants. Thus you greatly increase the earning capacity of your salvage department.

Whether your problem is crushing turnings, pulverizing coal, shredding wood or grinding some other substance, there's Jeffrey know-how and equipment to help you. Bulletin 837-A describes it. The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT •
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

Revere's GREAT NEW PRODUCT...

Tube-In-

It's a single piece of metal . . .

COPPER ★ BRASS ★ REVERE ★ ALUMINUM 1801

Patents Applied for

Available in Copper, Brass, other Copper Alloys, and Aluminum

Here, for the first time, is a combination of tube and strip that is made from a single piece of metal! No joints! The product of intensive development by Revere's Research and Development Department, which sought and found a brand new way to give American industry tube plus strip that is more economical to buy, more economical to work, stronger and more efficient in performing 1,001 tasks.

Remember Revere Tube-In-Strip is solid, not two strips welded, brazed, or bonded together.

What does this mean to you? You buy strip, fabricate it as you wish, stamping, bending or forming it, and then as a final operation inflation expands the integral channels into tubes. Expanding in the open, the tubes are round; by expanding into dies, the tubes can be made rectangular, fluted, half-round, hexagonal, etc.

METALS: Copper, Brass, other Copper Alloys, Aluminum, many others.

ECONOMY: You save in first cost, and in fabrication. New and improved designs are made possible. The web between the tubes conducts heat faster. The vastly increased structural strength means you can use lighter gauges, saving in weight and in price.

The applications of this radically new, different and superior Revere Product are unlimited. We most proudly present Revere Tube-In-Strip to the designers and manufacturers of American Industry. The Revere Technical Advisory Service and the Research and Development Department will gladly collaborate with you in taking full advantage of this marvelous new material.

SOME OBVIOUS USES

REFRIGERATION
- Condensers
- Evaporators
- Cooling Coils
- Cold Walls

AIR CONDITIONING
- Condensers
- Evaporators

HEAT EXCHANGERS
- Process Industries
- Chemical Industries
- Petroleum Industry

INSTRUMENT LINES

WATER HEATERS AND COOLERS
- Domestic
- Commercial

RADIANT PANEL HEATING

BASEBOARD RADIATORS

AUTOMOTIVE
- Car and Truck Radiators
- Heating and Cooling Panels
- Transmission Oil Coolers

AIRCRAFT

SOLAR HEATING

ELECTRICAL INDUSTRY
- Oil Coolers
- Gas and Fluid Heat Exchangers

AUTOMATION
- Control
- Recording
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MANY, MANY OTHER APPLICATIONS IN EVERY INDUSTRY

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COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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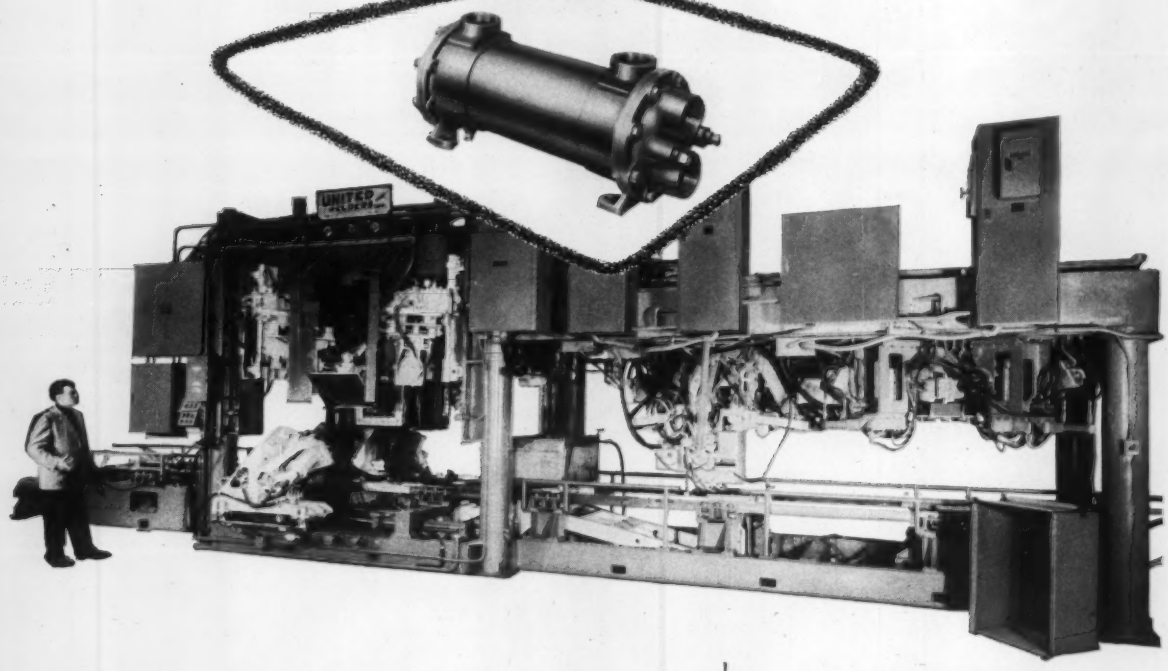
Mills: Baltimore, Md.; Brooklyn, N. Y.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.

ROSS EXCHANGER

cools oil while this United Welder mass-produces 200 refrigerator liners per hour



Completely automated, this United Multi-Station, Seam, Spot and Projection Welder transfers, locates, folds and welds 200 refrigerator liner assemblies per hour.

To maintain constant seam weld carriage speeds by preventing pump slippage from overheated, thinned oil, a Ross Type BCF Exchanger has been installed as original equipment. Although high pressures are developed in the folding and clamping operations, hydraulic oil temperatures won't vary from the "norm." *Efficient cooling is assured!*

The Ross Exchanger was selected, according to United Welders, Inc., "because it is economical, dependable and easy to maintain". Installing Ross Exchangers has become a regular habit of numerous manufacturers building hydraulic machinery of every description. It's the sure way of providing the utmost in thermal efficiency without expensive "specials" in either engineering or fabrication.

Rugged Ross Type BCF Exchangers are pre-engineered and fully standardized in a wide range of sizes to meet most needs.

For detailed information, request Bulletin 1.1K5.

ROSS

EXCHANGERS

ROSS HEAT EXCHANGER DIVISION
of
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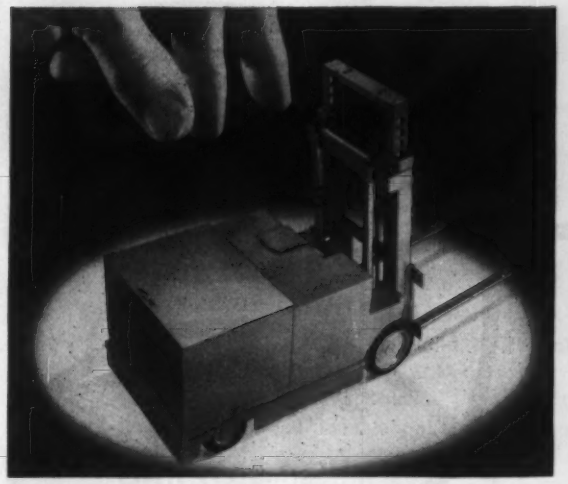
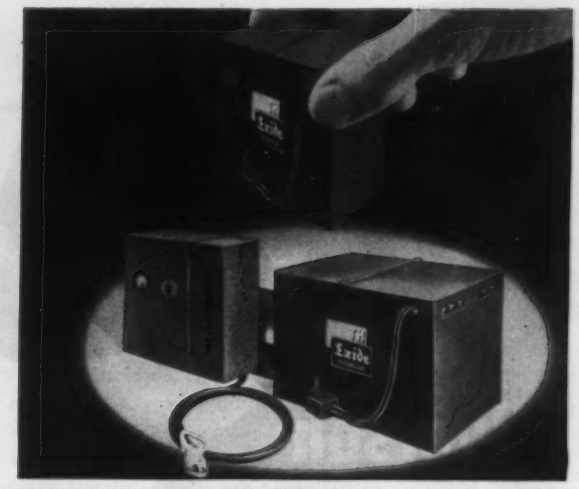
1431 West Avenue • Buffalo 13, N. Y.
In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

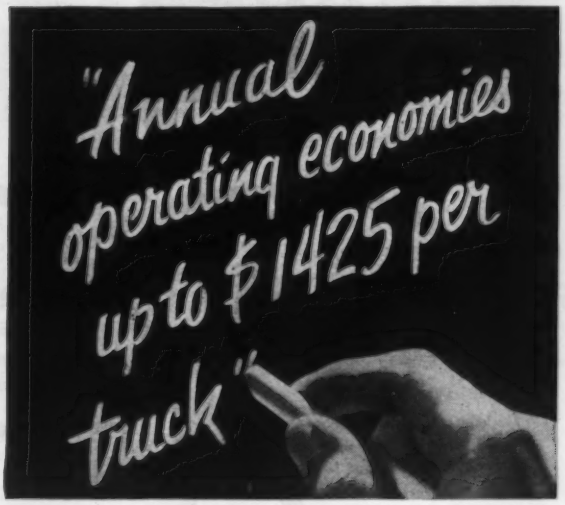


YOU BUY ONLY THE TRUCK CHASSIS. Choose any make of battery-powered electric industrial truck. Buy one truck or an entire fleet.



LEASE POWER PACKAGE FROM EXIDE. You receive famous Exide-Ironclad Batteries, plus the charger. Monthly cost is surprisingly low.

SAVE UP TO 33% CASH OUTLAY. This new Exide leasing plan brings initial cost for electric trucks down within range of trucks using any other kind of power.



PAY BATTERY LEASING COSTS OUT OF OPERATING ECONOMIES. Exide-powered electric trucks cost less to own and operate. Savings are tremendous!

SAVE UP TO 33% CASH OUTLAY ON ELECTRIC TRUCKS

New Exide leasing plan points the way to lower materials handling costs

Look how many ways Exide-powered electric industrial trucks can save you money just through operating economies: no wasted power when the truck is stopped; faster handling of materials; no unscheduled downtime; no high repair bills. *Added safety feature*—no bothersome fumes or noise. You pay for Exide power as you use it—the same as with other forms of power. But electric trucks give you over twice the operating life. Additional shifts multiply the economies.

Now you can have all these advantages at a new low initial investment—through the Exide leasing plan. And you get famous Exide-Ironclad heavy duty batteries with the unique positive plate. Electrolyte flows easily through slotted power tubes to reach more active material faster. Result: an Exide-Ironclad delivers more power quicker for a longer time at lower cost.

Get all the facts and figures on how the Exide leasing plan can meet your particular requirements. Call your Exide sales representative. Talk with any electric truck salesman. Send the coupon.

Exide

Send for complete details

Exide Industrial Division
The Electric Storage Battery Company
Phila. 2, Pa.

Send me details on the new plan for cutting cash outlay on electric trucks.

Name_____ Title_____

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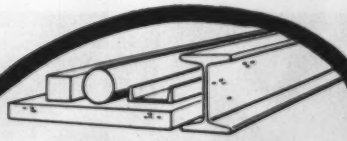
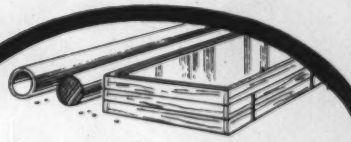
32

call Ryerson for steel



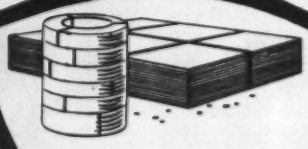
CARBON STEELS

Hot rolled and cold finished bars; channels, angles, beams, etc.; plates of every kind.



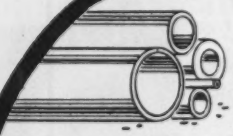
STAINLESS STEELS

World's largest stock of sheets, plates, bars, pipe, tubing, fittings, etc.



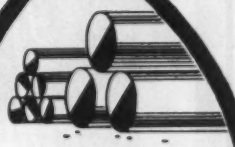
SHEET AND STRIP

Over 20 kinds and many gauges—in pattern sizes or cut to your order.



TUBING

Mechanical and pump cylinder tubing, seamless and welded; hydraulic fluid line and boiler tubes; structural tubing, etc.



ALLOY STEELS

Tested alloys of known hardenability, standard and aircraft quality, as rolled, annealed, heat treated.

Quick delivery from nation's largest stocks

Need steel in a hurry? Ryerson stocks are the nation's largest, so one call to your nearby Ryerson plant brings quick delivery of almost any kind of steel in almost any quantity—all of it certified for high uniform quality.

Do you want your steel prepared for immediate use? Ryerson facilities include the most modern close-tolerance equipment for sawing, shearing and flame cutting to your specifications.

Of course, current heavy demand makes it difficult to keep all sizes always on hand but our stocks are being replenished continuously. Steel that's out of stock today may be in stock tomorrow. And experienced Ryerson steel men will help you make the most of steel on hand. So for everything in steel and steel service . . . call Ryerson.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

STEEL
February 27, 1956

Metalworking Outlook

Troubles in Nickel

Nickel suppliers will hold up shipment of military rated orders to certain consumers. Business & Defense Services Administration called the halt because it looks like some buyers of the metal are misusing defense ratings to get additional supplies. Future rated orders of the suspect firms will also be sent by suppliers to BDSA for examination. Although the amount of nickel involved is less than 1 per cent of the total amount ordered for defense needs, BDSA thinks action now will stop any future finagling. Violators may be subject to prosecution by the Justice department.

Copper Setasides Drop

Second quarter setasides of mill space for copper-base products will turn out about 104 million lb for military and atomic energy requirements. That's a decrease of 12 million lb from first quarter. Percentages of mill space reserved for alloyed brass mill plate, sheet, strip and rolls is down from 8 to 6 per cent; rod, bar, shapes and wire decreased from 7 to 5 per cent; alloyed seamless tube and pipe, from 20 to 16 per cent. The reserve for unalloyed brass mill plate, sheet, strip and rolls remains at 8 per cent; unalloyed rod, bar, shapes and wire remains at 9 per cent. Unalloyed seamless tube and pipe remains at 5 per cent. Wire and cable mills will reserve 9 per cent of mill space, the same as in the first quarter. Foundries' space setasides hold at 8 per cent.

Uranium: Big Business

The uranium industry is approaching a $500-million-a-year business, with the real market ahead as atomic power develops. To help that development, Atomic Energy Commission issued 59 more access permits in January to firms wanting to look at the commission's confidential and secret data relating to civilian uses of atomic energy. Permits issued since the program began last April total 661.

The 35-hour Week

The 35-hour work week may be a hot issue in labor negotiations this year. International Association of Machinists seeks it with Southern California aircraft companies. Some metalworking managements are not averse to a 35-hour arrangement. In normal times they want to work 40 hours, with contract provisions that they can cut back to 35 when necessary. Such a deal would reduce layoffs and lower a company's SUB liability, if it has the layoff-benefit type of labor agreement.

Portrait of a Problem

Troubled by absenteeism? Heres' a picture of the chronic absentee, as drawn for the annual congress on industrial health of the American Medical Association: The absentee is married, female, on the third shift, be-

Technical Outlook—p. 109 Market Outlook—p. 153

tween 26 and 35 years old, in a large city and a large firm with broad benefit plans, is low on the wage scale, has little responsibility and little liking for her work, and her absence often occurs on the day after a holiday in a period of high prosperity.

The Executive Reserve

President Eisenhower wants about 3000 to 4000 businessmen in a National Defense Executive Reserve on which government mobilization agencies could draw in case of war or emergency. Experts are wanted in metals, minerals, petroleum, transportation and communication. First "enrollees" will probably be men with experience in Washington during the Korean war or earlier, also those who have served with BDSA. Participation will be voluntary, and the employer's consent will be needed.

Trigger Contracts Revised

Machine tool contracts to be made now and to be triggered into existence automatically in case of war or emergency will be redrafted by General Services Administration. An industry task committee objected to some of the original provisions. While waiting for GSA, BDSA is going about the business of selecting builders and developing types and quantities of tools to be included in the program.

Machinery: Going Up

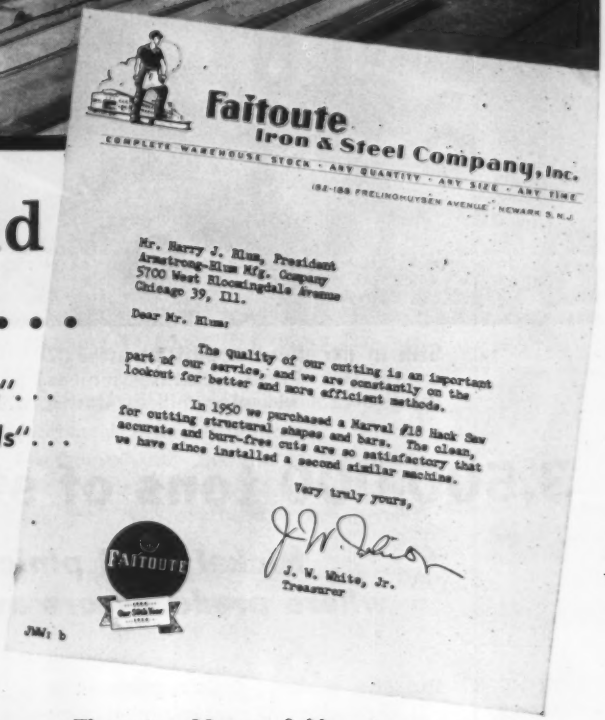
Machinery manufacturers are only just beginning to realize benefits from the unprecedented 1955 business boom because they generally require 6 to 18 months to translate an order into a delivery. *Value Line Investment Survey* expects 1956 to be one of the best years the industry has ever enjoyed because backlogs are still climbing. The makers of heavy machinery are in the best position since their order backlogs are now the largest.

Ford's Foreign Expansion

Ford Motor Co. affiliates in countries outside the U. S. will have invested more than $500 million in new plants, production facilities and tooling between the end of World War II and the completion of overseas expansion programs now underway. That's in addition to the $3.75 billion postwar program in the U. S.

Straws in the Wind

General Electric Co. sales hit $3,095,352,063 in 1955, 5 per cent higher than in 1954. . . French financing and technical assistance will help build a $28-million steel plant on Mexico's Pacific coast; production is scheduled for 1958, with a planned annual capacity of 150,000 tons of ingots and 75,000 tons of steel beams and rolled sheets. . . The Federal Reserve Board will make a special study of consumer installment credit. . . The American pulp and paper industry plans a record $1.3 billion expansion over the next two years.



Faitoute Iron & Steel Company, Inc.

COMPLETE WAREHOUSE STOCK · ANY QUANTITY · ANY SIZE · ANY FINE

182-188 FRELINGHUYSEN AVENUE · NEWARK 5, N.J.

Mr. Harry J. Blum, President
Armstrong-Blum Mfg. Company
5700 West Bloomingdale Avenue
Chicago 39, Ill.

Dear Mr. Blum:

The Quality of our cutting is an important part of our service, and we are constantly on the lookout for better and more efficient methods.

In 1950 we purchased a Marvel #18 Hack Saw for cutting structural shapes and bars. The clean, accurate and burr-free cuts are so satisfactory that we have since installed a second similar machine.

Very truly yours,

J. W. White, Jr.
Treasurer

JWW: b

Faitoute Found the Answer.....

"for cutting structural shapes and bars"...

"clean and accurate with burr-free ends"...

..... another example of the efficient cutting off of structurals with a MARVEL No. 18 Hydraulic Hack Saw.

If your shop is required to cut structurals, bar stock or beams—clean, accurate and burr-free – then you should consider a MARVEL Hydraulic Hack Saw (No. 18 Capacity 18" x 18": and No. 24 Capacity 24" x 24"). These giant saws are truly designed and built with the ruggedness and rigidity necessary to withstand the rough treatment of sawing big work, even though the work is in the "toughest of the tough" alloys.

There is a MARVEL field engineer near you capable of intelligently discussing your cut-off work. Send for Catalog No. C-55 and the name and address of your nearest MARVEL field engineer.

MARVEL *Metal Cutting* **SAWS**

Better Machines–Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Avenue • CHICAGO 39, ILL.

Still in excellent condition after 37 months. One of three nickel steel pinions from the 43" blooming mill of United States Steel Corporation at Youngstown is ready for more gruelling work. Previous pinion life was 5½ months.

3,500,000 tons of steel...their output

Nickel steel pinions excellent after 3 years' use where predecessors averaged 5½ months

WORKING 37 MONTHS without interruption in a 43" blooming mill, three pinions cast in nickel alloy steel produced more than seven times the output of previous pinions . . . and were still in excellent condition.

This performance . . . in a United States Steel Corporation plant . . . reflects the high level of performance offered by cast steel containing nickel.

Producer of the nickel steel pinions, Mackintosh-Hemphill Division of E. W. Bliss Company, Pittsburgh, Pa., cast them in a 3½% nickel, medium carbon steel. Heat treatment developed the following physical properties:

Tensile Strength psi, min	100,000
Yield Point, psi	70,000-80,000
Elongation % in 2"	25-20
Reduction of Area, %	50-45
Charpy V-Notch Impact, ft.-lb	20-17
Hardness, Shore	34

The properties of nickel alloys may be controlled to meet both fabricating and service demands. So when you need a metal for improved performance and fewer replacements . . . let's talk it over. A nickel alloy may offer exactly what you want.

Write for . . . "List A" of available publications. It includes a simple form that makes it easy to outline your problem for our study.

INCO TRADE MARK **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N.Y.

Milestones or Millstones?

Whether your business is manufacturing and selling or purely distribution, you probably wonder how to cope with the baffling problem of rising expenses and sagging profits. You probably wonder whether specific products in your line are really milestones in your operation or millstones around your neck.

Statements prepared by your auditor tell you how much your expenses are and whether you make money. These statements are drawn primarily to serve your stockholders, your bank and the tax collectors. They aren't designed to help management run a business.

As a case in point, members of the American Steel Warehouse Association found that in 1954 their net profit after taxes was only 1.5 per cent of sales, compared with 6 per cent for 29 major steel producers. To find out where he really stood, one ASWA member called in a consultant to functionalize costs and relate them to specific products. This approach to costing proved so helpful that other warehouses are planning to adopt it. Here's the way it works:

Expenses ordinarily are divided into their natural divisions, such as wages, salaries, utilities, insurance, depreciation, travel and entertainment. Distributed into functional divisions for a warehouse, they become product costs (order processing, slitting, shearing, delivery, etc.); customer costs (outside selling, city desk selling, general clerical, etc.) and overhead costs (general administration, accounting).

Functional costs are allocated to each product. As examples, order processing is charged on the basis of the number of transactions, slitting on time tickets for jobs, delivery costs on shipping weights and outside selling on a sales base.

Costs and profits are computed by products, by unit sales to specific customers and by territories. Responsibility for costs can be assigned to specific individuals. Salesmen's expenses can be controlled in relation to volume sold. Small orders can be classified as profitable or nonprofitable.

While warehouse costs are largely those of selling and administration, operations like shearing and slitting are analogous to manufacturing costs.

This functional approach to analyzing distribution incorporates ideas that may help you know your costs and set up more realistic selling prices. Why not convert your product millstones into milestones?

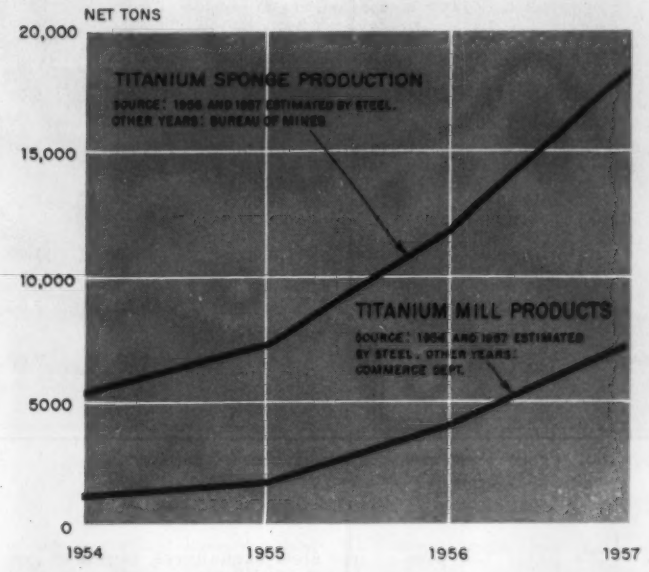
Irwin H. Such

EDITOR-IN-CHIEF

WHO TOOK THE CAT OUT OF THE GROCERY BUSINESS?

You don't have to be as old as the hills to remember when practically everything you lugged home from the grocery store came out of a sack, a crate or a barrel. The revolution in food packaging has taken place within recent years. Can-makers and food processors have placed on our tables an infinite variety of basic foodstuffs and exotic delicacies. Steel has shared in this progress. At Inland, we've been working closely with can and container manufacturers for many years, helping to make steel an increasingly versatile and useful packaging material.

INLAND STEEL COMPANY *38 South Dearborn Street, Chicago 3, Illinois*
Sales Offices: Chicago, Milwaukee, St. Paul, Davenport, St. Louis, Kansas City, Indianapolis, Detroit, New York. Steel products supplied to the steel container industry include tin plate, black plate, hot and cold rolled sheets and strip. Other products: plates, structurals, Ti-Co galvanized sheets, 4-Way safety plate, bars, reinforcing bars, rails and track accessories, coal chemicals.



Titanium Sponge: Annual capacity (net tons) expected by 1957:

E. I. DuPont de Nemours & Co. Inc.	3,600
Titanium Metals Corp. of America	3,600
Cramet Inc.	6,000
Dow Chemical Co.	1,800
Union Carbide & Carbon Corp. (Electro Metallurgical Co.)	7,500
Total	22,500

Mill Products Producers:

Mallory-Sharon Titanium Corp. (jointly owned by Sharon Steel Corp. and P. L. Mallory Co.)

Rem-Cru Titanium Inc. (jointly owned by Crucible Steel Co. of America, Remington Arms Co. Inc.)

Republic Steel Corp.

Titanium Metals Co. of America (jointly owned by National Lead Co. and Allegheny Ludlum Steel Corp.)

Titanium Gets Second Wind

More civilian applications of the light metal appear to be on the threshold while current orders continue to come in fast. Republic Steel may become second integrated producer

TITANIUM may yet measure up to the "Wonder Metal" tag put on it by overenthusiastic promoters some years back. At any rate this baby of the structural metals is fast recovering from the black eye it got for failing to measure up to its early press notices.

The outlook is for use to expand rapidly (see chart).

Some Reasons — "In 1955 we manufactured titanium bolts mostly in qualification lots; output was usually measured in pounds. This year our production will be in tons," states H. Thomas Hallowell Jr., president, Standard Pressed Steel Co., Jenkintown, Pa.

Arthur Schweitzer, sales manager, jet division, Thompson Products Inc., Cleveland, comments: "Because of one new jet engine going into production, use here will go up four to five times this year and three to four times next year."

"We expect to use twice as much titanium in 1956 as last year," says Charles H. Smith, president, Steel Improvement & Forge Co., Cleveland.

Another company used 1500 lb in 1955, will use 103,500 this year. One company alone will fabricate over 1.3 million lb of mill products this year.

Alexander Black, vice president, Solar Aircraft Co., and general manager of the Des Moines, Iowa, plant, says that company has several million dollars' worth of orders for titanium fabrications.

Advances—"1956 promises to be one of important advances: In quality improvement, in increased production and sales and in important technological advances, particularly alloy development," reports C. I. Bradford, president and general manager, Rem-Cru Titanium Inc.

"Order tonnages have now risen to such volume," says Titanium Metals Corp. of America, "to justify engineering major conversion equipment adapted to titanium's characteristics." So TMCA has ordered a $3-million Sendzimir reversing cluster mill for mold-rolling sheet up to 49 in. wide. The mill, expected to go into Allegheny Ludlum Steel Corp.'s Brackenridge, Pa., plant, will give more accurate gages and a better mirror finish than the stainless steel equipment now used. Rem-Cru and Mallory - Sharon Titanium Corp. are reported to have placed orders for similar mills.

Expansion talk is in the wind. Current deliveries on mill products run 12 to 18 weeks, which users say "isn't too bad." But that could change.

Hot Spots — Possible trouble spots productionwise may be in vacuum melting capacity and heat treating and other processing facilities. More melting capacity is due late this year. The question: Will it be ready in time to meet demand?

Sign that the industry is growing is the Republic Steel Corp. of-

Titanium Price Trends

(per lb)

Sponge, grade A-1	
Feb. 27, 1956	$3.45
Nov. 23, 1955	3.45
Nov. 1, 1955	3.75
Apr. 1, 1955	3.95
Jan. 1, 1955	4.50

Source: STEEL

Mill Products

(per lb, 10,000 lb and over, f.o.b. mill)

	Feb. 27, 1956	Dec. 5, 1955	June 6, 1955	Feb. 28, 1955	Jan. 1, 1955
Sheet	$13.10 to 13.60	$13.10 to 13.60	$14.00 to 14.50	$15.00	$15.00
Sheared mill plates	10.50 to 12.00	10.50 to 12.00	11.00	12.00	12.00
Strip	13.10 to 13.60	13.10 to 13.60	14.00 to 14.50	15.00	15.00
Wire	9.50 to 11.50	9.50 to 11.50	10.00 to 10.50	10.00	11.00
Forging billets	7.90 to 8.15	7.90 to 8.15	8.75	9.00	9.00
Hot-rolled forged bars	7.90 to 8.15	7.90 to 8.15	8.75	9.00	9.00

fer to buy a half interest in Cramet Inc. if federal agencies approve. That would make a second integated producer, since Cramet makes sponge and Republic turns out mill products and has extensive rutile (titanium ore) deposits in Mexico. Titanium Metals is now the only integrated producer.

Roadblocks—Two big obstacles to even more rapid titanium growth stand out: Price and technical know-how; both are being chopped down to size.

Sponge prices, for example, dropped 23 per cent in 1955, mill products about 19 per cent. From now on, reductions will be slower. It all depends on sponge prices, say mill products producers, who feel they have gone about as far as they can by improved rolling and handling.

Economical — It's pretty well agreed that use of titanium is economically justified now in fighter and bomber airframes, jet engines and long range ballistics missiles even at $8 to $13 per lb for mill products.

Civilian aircraft, too, are using it. Douglas Aircraft Co. engineered about 350 lb of titanium sheet into early versions of the DC-7 transport. The newer DC-7C has 850 lb, saving about 300 lb in total aircraft weight. It's estimated that each of those pounds saved is worth $40 additional payload.

Timetable—"It's likely the preponderance of titanium will continue to be in aircraft, at least until prices come down to $3 to $5 a lb," says C. M. Brown of Electro Metallurgical Co. That may take 10 to 15 years, according to one industry source.

Titanium is finding customers on the ground, too. "We're just now beginning to find economical applications," say DuPont's titanium experts. "More people are finding out that the price isn't as high as it looks on paper. Titanium components priced at two and one-half to four times the part they replace are often well worth the added cost."

For Example—1. A 74-tube heat exchanger of 347 stainless steel costs $3200. A similar titanium unit priced at $7600 is economical because it will last ten times as long. Reduction in downtime for replacement is another gain.

2. A $32 thermowell of 309 stainless which had to be replaced "regularly" in an autoclave cost one company $1600 in labor and lost production time for each replacement. Life of a $75 titanium unit is conservatively estimated at five years.

3. Two and one-half years ago a firm bought three titanium heat exchangers intending to use two and keep the third as a spare. They had been getting three months' service from their stainless steel exchangers, hoped to get 9 months' service from the titanium. They still haven't had to use the spare.

More Sponge—If present growth rates continue, look for a reopening of the expansion goal for titanium sponge facilities. Back in September when he suspended the goal (under which facilities are eligible for fast tax writeoff) Defense Mobilizer Arthur S. Flemming said sponge capacity under government contract appeared to provide for projected military use until 1957 but that the program will be under continuous study. Since it takes two years or longer to get a sponge plant into production, it would seem that the goal may be reopened to meet a demand that will likely catch up with present sponge capacity in 1958 or 1959—the more so since it's felt that present use doesn't quite mirror demand because the lag between the decision to use titanium and actual use is as long as three years. And many companies are just getting their feet wet.

Potential Customers — Civilian uses are on the threshold of importance. Among the biggest will be chemicals, paper pulp, pharmaceuticals, petroleum, ore beneficiation, food, marine, utilities, electronics and atomic energy.

Steam turbine people are interested. With present materials, top

Standard Pressed Steel fabricates these tough bolts from titanium

speed has about been reached; titanium in the turbine blades would decrease weight. Other high speed rotating or reciprocating parts are also potential users.

In instrumentation — particularly in gyronavigational equipment —titanium's low magnetic permeability can be an important asset.

Problems — Development and testing of titanium take time and money. Mr. Hallowell of Standard Pressed Steel says: "We spent three years of research and development work and painstaking dynamic testing before introducing our Hi-Ti titanium tension and shear bolts in 1955. Customer testing and verification took most of the year.

"The major breakthrough came in October when Convair placed an order for $650,000 worth. Since then we have received major orders from two more leading airframe companies for titanium bolts for use on production model planes."

More Progress—Pheoll Mfg. Co., Chicago, and its subsidiary, Voi-Shan Mfg. Co., are also making titanium fasteners. Within the past 12 months they've patented and obtained government approval of high shear rivets for airframe work and for Hi-Torque screws (also for aircraft).

Such bugaboos as hydrogen embrittlement, notch sensitivity and consequent low fatigue strength have been largely overcome. "Whereas sponge quality was a subject of constant scrutiny in 1954 there was so much improvement in 1955 that the subject lost interest," says T. W. Lippert, manager of sales and technical service, Titanium Metals.

Users Agree—"Sponge producers in the past 18 months have increased quality to a very high degree," says Crane Co., Chicago.

Also coming are big advancements in heat treatable alloys having outstanding strength/weight ratios. Harvey Machine Co. reports excellent progress in developing new alloys in ingot, extruded rod, forgings and bar and shapes.

• Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.

Opportunity—Dr. John T. Burwell, vice president, Horizons Inc., Cleveland, says titanium powder metallurgy shows great promise because it eliminates melting. Casting is another area of titanium development that remains relatively unexploited, notes D. J. McPherson, assistant manager, metals research, Armour Research Foundation.

A process for horizontal casting of titanium is being worked on by Technical Developments Associates Inc., Cleveland. Described as being in an advanced stage, the new scheme will not need the skyscraper heights of present methods of melting preformed consumable titanium electrodes. It will eliminate some steps in finishing.

Big improvement has come in welding. DuPont says that a good stainless steel welder has little trouble welding titanium after moderate practice—though some alloys give considerable difficulty. According to the Bureau of Mines, titanium plates ½ in. and thicker can be welded in the open air with relatively little contamination if both the back and the face of the weld are blanketed with inert gas.

Castings—The bureau also reports successfully casting ordnance parts up to almost 100 lb from a consumable electrode furnace. Skull type furnaces are being used to make both gravity and centrifugally cast parts of smaller size.

One problem that still remains is: What do you do with the scrap, especially alloy scrap. Few fabricators generate enough to make segregation worthwhile, and analysis of many alloys is difficult or economically impossible. So, much scrap is wasted.

Markets — The Navy and the Army remain potentially lucrative markets for titanium. The Army is interested in lightening airborne vehicles and equipment, has said it could use 1 million tons a year for tanks and other ordnance if the price was $3 to $4 a lb for plate.

The Navy too is waiting for the price to come down. It would like to take advantage of titanium's corrosion resistance in salt water piping on ships.

J & L Stakes Ore Claim

Jones & Laughlin Steel Corp., Pittsburgh, has optioned an iron ore deposit estimated to contain 250 million tons of concentrates in northern Quebec. J & L will spend $250,000 on exploration in the next two years. If the deposit proves out, beneficiation plant will be installed to bring the crude non-magnetic ore above 60 per cent iron content. So far, just a surface survey has been made.

How Much More Automation?

(Figures refer to percentage of operation not yet automated, but which respondents think could be profitably.)

	Machining	Metal Forming	Production Welding	Grinding & Finishing	Materials Handling	Inspection	All Operations
Total Metalworking	23	20	15	15	23	17	16
Automotive	33	20	12	25	33	33	20
Aircraft	30	10	10	20	20	20	20
Fabricated Metal Products	20	20	15	20	25	20	17
Heating, Ventilating, Air Conditioning, Refrigeration	20	15	40	15	30	15	—
Precision Equipment	20	20	13	20	20	13	15
Transportation (Other than Automotive)	20	—	20	—	25	—	15
Machinery	15	—	—	8	—	—	5

Based on a survey by the American Society of Tool Engineers

Automation Market Forecast

MORE THAN 200,000 machine tools, 55,000 grinders and finishers, close to 50,000 metal forming machines, about 25,000 production welders plus related amounts of other types of production equipment—that's the metalworking market for new automated equipment, says the American Society of Tool Engineers.

Survey—The ASTE bases its conclusions on a just completed survey of its membership (33,000 production executives and engineers), covering major metalworking industries throughout the U. S.

The survey refers to production operations in metalworking not already automated, and suggests that 16 per cent of those operations could be automated profitably.

Conversion — Some automation can be accomplished economically only if existing equipment is modified. ASTE estimates that only 5 to 10 per cent of all existing metalworking equipment can be converted. But even so, that amounts to a whopping total—125,000 machine tools, 25,000 grinders and finishers, 40,000 metal forming machines, 12,000 production welders and proportionate amounts of related equipment. The conversions would all require the purchase of new loading and unloading devices, control equipment, etc.

Largest Market—While the estimated percentage of automatable operations possible in the fabricated metal products industry is below some other fields (see chart), it probably represents the largest market by virtue of its size.

Some 144,000 production operations remain to be profitably automated in this field alone, says ASTE. This would mean a market for 30,000 machine tools, 20,000 to 25,000 metal forming machines, 7000 production welders, 10,000 to 15,000 grinding and finishing machines plus related equipment. Conversion of existing equipment would take care of the balance of automatable operations. The industry's program is going strong already with 25 per cent of its planned new equipment purchases in 1956-57 scheduled to be automated.

Out in Front—The automotive industry continues to lead the way to automation. Including parts and accessories suppliers, some 65,000 production operations could still be profitably automated, and real progress toward this goal is indicated by the amount of automated equipment to be bought in the next two years: 35 per cent of all machinery purchases.

The market there includes 25,000 automated machine tools, 10,000 grinders and finishers, 5000 metal forming machines and 4000 welding machines.

Other major metalworking industries are planning heavy expenditures for automated equipment in 1956-57: Aircraft manufacturers say 21 per cent of new equipment purchases will be automated types; electrical equipment (including appliances), 18 per cent; transportation (other than automotive), 18 per cent; heating, ventilating, air conditioning and refrigeration, 15 per cent; precision equipment, 15 per cent; machinery, 11 per cent.

Metalworking as a whole predicts 18 per cent of equipment purchases will be automated in 1956. For the 1956-57 period, the figure will hit 22 per cent.

Fewer Big Plants—In an age of automation the medium-sized plant will be the most efficient, the ASTE survey indicates. It is easier to automate the manufacture of an engine, a transmission or an axle, than to automate production of a complete automobile.

Plants employing 1000 to 5000 workers report the highest percentage of operations remaining to be automated—20 per cent. Many of these plants told ASTE the figure could be 50 per cent. Included were manufacturers of sheet metal products, forgings, venetian blinds, clocks, automotive parts and aircraft hardware.

About one of ten plants employing 250 to 999 workers reported that half of their operations could be automated profitably. This group will make 30 per cent of their new equipment purchases in

1956-57 automated equipment.

Design Influence—If automation takes hold on the broad scale suggested by its potential applications to metalworking, it will produce major influences on the design of future products. To avoid obsoleting costly automated equipment, designers will seek a new concept of standards to permit variations in products from model to model, rather than expensive changes.

Needed—The automation of assembly operations is particularly needed by the automotive industry. A few other industries believe they already have the problem licked: One battery manufacturer told ASTE that 50 per cent of his assembly operations were automatable.

As yet there are no expectations that automation can be applied to job shops or job-lot runs. When and if such equipment is provided, the ASTE concludes, automation should take a major step forward.

GM's Payroll Reaches Record

Wages paid to General Motors' workers hit a new high in 1955. Average weekly pay packet was $102.41, compared with $91.44 in 1954. The increase in part reflects added overtime scheduling, for the average work week last year was 42.5 hours compared with 40.4 in 1954. Another influencing factor: Model changeovers were made earlier and faster than in previous years.

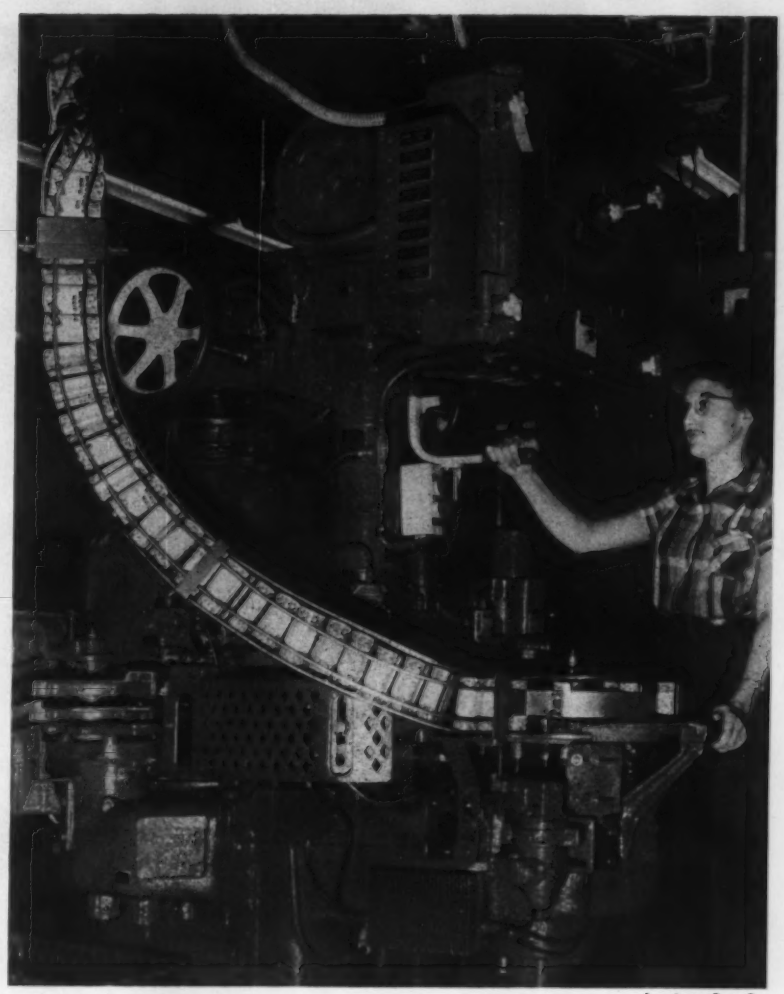
GM's total payroll bill for all operations was $3.1 billion, more than a quarter of total sales.

Guide to Government Buying

Who buys what and where in the United States Government? Any questions along this line are answered by a new edition of the U. S. Government Purchasing Directory, just announced by Small Business Administration.

It lists some 4000 classes of commodities covering more than 5 million items bought by both military and civilian agencies.

You can get your copy for 50 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.



American Can Co.

In machinery like this, in the product, in its uses . . .

Research Opens Can Market

FOR A GOOD example of how marketing and laboratory research pay off, take a look at the can-making industry:

* Last year's production hit 38 billion metal cans, against 36.2 billion in 1954 and 21 billion ten years ago. Last year, 4.5 million tons of metal cans were shipped (see table).

* The average American family consumes the contents of 780 cans a year, compared with 486 in 1939 and 130 at the turn of the century.

* Last year 500 million cans of carbonated beverages were sold, twice as many as in 1954 and seven times as many as in 1953.

* Fifty billion beer cans have been made since they were first marketed in 1935. Last year, 8 billion were made.

* New uses are continually being found for metal cans, and big strides are being made on cutting down the amount of tin needed to coat each can.

There are well over 100 canmakers, with plants in every state except Nevada, serving the nation's

4500 canneries. Continental Can Co., New York, has a typical research program.

Line-Up — Continental's activities are decentralized into separate departments for each of its various product divisions.

Each department is responsible for the improvement of materials, methods and containers and for the development of new uses and new containers for its product division. This permits research and engineering personnel to work as a team on the development of an idea through research, engineering design, production and final evaluation.

Breakdown — Continental's largest research and development department is at Chicago in the metals division. It covers four major areas: 1. Container development. 2. Equipment development. 3. Equipment standards. 4. Chemical and physical laboratories.

The container development group is broken down, in turn, into five teams. Members design new container structures and select plate, protective coatings, solders, fluxes, sealing materials and cements. They develop methods of can-end manufacture, double seaming, side seaming, enameling and baking. They select suitable containers for the various products and specify conditions under which the products should be packed. They are also responsible for the design of container tooling.

Production—The equipment development department takes the project over next. Its first group handles machine design. Its second, experimental machine shop, manufactures prototype machines and tests their performance before trial under commercial operating conditions. The third section sets up experimental can lines for testing machinery improvements under commercial operating conditions.

After equipment passes initial evaluation and production tests, the standards department takes over. It is the focal point for suggestions for improvements from many sources outside research, including operating plants, production engineering groups and machine shops.

Chemical and physical laboratories provide technical service to the other groups. In addition, they are responsible for some development projects, the production of a variety of chemicals.

Continental Can Co., within the last two years, has also set up a central research and engineering division to carry on work of a longer range and more fundamental nature. It conducts work for all product divisions and investigates fields where the company does not have product divisions and where a profitable new product might lie. It researches new materials, packages, products and methods of using them.

Sales Outlook—Though all canmakers do not have the same system as Continental, all share its belief that research is fundamental to industry progress. American Can Co.'s president, William C. Stolk, headquartered in New York, expects industry output to reach from 39 to 40 billion cans this year. He believes that by 1960, it should run well over 40 billion. Mr. Stolk sees much promise in the new pressure cans. He says that "soft drink cans have the potential to become one of the industry's most important products."

R. G. Fisher, director of economics research, Continental Can, looks for can sales to improve as much as 10 per cent this year. Again, new types and new uses are basic to his optimism. Cans for liquid detergents, soluble coffee are mentioned as comers.

Problems — Foremost of research's responsibilities, believes American Can, will be to solve the problem of packaging and marketing the more than 10 billion additional pounds of food that will be required by this country within the next 20 years.

Long range can planners are working on problems related to biochemistry, bacteriology, cold sterilization by nuclear fission products, and the development of new materials for container manufacture. This takes research in metallurgy, corrosion control, organic coatings, adhesives, waxes, soldering and welding methods and the mechanical engineering aspects of container construction.

Materials—One long-range project aims at eliminating our dependence on tin as a raw material. Though today's average food can is about 99 per cent steel and only 1 per cent tin, tin still does the job of that 1 per cent best. Also, it alloys readily with steel, acts as a lubricant during can fabrication and provides a good soldering surface. But a growing tonnage of steel is going into tinless cans for motor oil, antifreeze, pet food and coffee, among other products.

Were costs more competitive, aluminum could be used extensively. One approach: Growing popularity of aluminum coating on steel. Some researchers believe that future cans may come in many different metals, each tailored to fit specific product needs.

Payoff — There is a constant drive for new features that will add to the attractiveness, efficiency, convenience and economy of containers. More recent results: The nondrip designs, which are stimulating sales of canned syrups, detergents and other products; a new quart beer can, with reclosable snap cap; and new coffee and frozen soup cans.

Today, more than 2500 products are packed in cans by more than 135 industries. Alert research and marketing activities of the can makers have contributed their full share.

Shipments of Metal Cans

(In terms of net tons of steel consumed)

1955	4,485,295	1950	3,890,110
1954	4,143,329	1949	3,276,925
1953	4,082,254	1948	3,245,145
1952	3,842,170	1947	2,956,116
1951	3,804,551		

Source: Bureau of Census

Black & Decker Mfg. Co.

Do-it-yourself trend builds a market in industry as . . .

Electric Tool Sales Triple

PORTABLE electric tools, though battling for the industrial market with air tools, are still selling well. Reason: Growing popularity of the electric tool for home use.

This year's sales should hit $150 million, split about equally between the two markets. That's almost triple the sales in 1946. And since 1952, when do-it-yourself got rolling, the increase has averaged close to $20 million a year.

Differences—Points out W. H. Ferry, manager, industrial division, Skil Corp., Chicago: "Few do-it-yourself tools are practical for use in industry." Though design is similar, industrial-grade tools demand higher performance.

Some production equipment, indeed, is specialized to the extent of needing special power sources. High and super cycle portable electric tools operate on 180 and 360-cycle current as opposed to the standard 60-cycle.

Overlap—The 60-cycle tool is still popular with industry. For maintenance and repair, it works anywhere there's a standard power outlet. For markets like auto service shops, though tools are built to industrial performance standards, 60-cycle power is adequate.

Drilling, cutting and grinding are leading tool types. There are also numerous fastening tools like screwdrivers, nut runners and impact wrenches.

Tool Types — Saws, polishers, orbital and disc sanders, grinders, hammers, shears and planes are other major portable electric tool categories. Versatility of almost all is broadened by the wide range of attachments available.

Hammers, for instance, though used primarily for masonry work, will chip metal and remove weld splatter. With suitable wood chisel attachments, they shape and chip timber.

Design—Ten manufacturers account for more than 60 per cent of portable electric tool sales. All are working hard improving their products. Black & Decker Mfg. Co., Towson, Md., has a new 6½-in. heavy duty saw which combines safety features with increased power and cutting range.

Design trend is towards lighter and smaller but more powerful tools. Work is being done on light alloys, bearings and gears and motors. Power range is from ⅛-hp for small hand grinders to three or four hp for heavy duty saws.

Full Circle—The home workshop has proved much more than just another market for portable electric tool makers. Concludes Mr. Ferry: "Do-it-yourself is now repaying us on the commercial market. It has popularized the tools with workmen and made industry more conscious of what they can do."

Savings through standardization are apparent as . . .

Pentagon Catalog Shapes Up

BENEFITS of the Defense department's cataloging and standardization programs are beginning to show up at a rapid clip.

In the last six months, 26,473 generally similar items in the military supply systems have been eliminated with savings of over $5 million, 929,771 cu ft of space and 166,641 manhours.

Speed-Up—The pace will probably quicken when the federal catalog is finished Sept. 30. The catalog will show up the areas where real payoffs are to be had by standardization, comments Roger Gay, who heads up the programs on leave from his post as chairman of Bristol Brass Corp.

Developments—Electronics data processing will play a big part in effective use. Says T. P. Pike, assistant secretary of Defense (Supply & Logistics): "Recent production models of electronic equipment offered by various business machine makers afford a flexibility in assembling information that were unheard of until the recent past and that probably is not yet fully appreciated, even by those working in the field."

Some of the progress already made: The Army has standardized on 26 types of arc welders instead of the former 52. The Air Force can use $350,000 worth of oil pressure transmitters that otherwise would have been excess. The Navy was able to do without 2135 specialized electrical and electronic items and 2790 mechanical and hydraulic items by using standard parts that could do the same job.

The Army still isn't finished standardizing on combat vehicle components, but reports that 36,550 spare engine parts have been reduced to 8500; vehicle engines and transmissions cut back from 48 to 13; electrical components from 1418 to 114.

Housing Upturn Sighted

There are indications of a strong spring upturn in housing ending the dip in housing starts that began about five months ago.

Veterans Administration reports appraisal requests for 29,284 proposed homes during January, an increase of nearly 18 per cent over December. A bigger jump could come as VA officials say it still is too early to feel the effects of the partial relaxation of credit controls announced Jan. 17 (restoring the 30-year terms on GI loans).

Federal Housing Administration reports a like 18-per-cent increase on applications for mortgage insurance, the first upturn in five months.

Here's an Auto Market

The government's 211,198 motor vehicles now average 5.3 years old and aren't being replaced at an economical rate, warns Edmund F. Mansure, recently resigned head of General Services Administration.

"The average age of units has increased in two years from 4.4 years to 5.3 years. This continued increase in vehicle age is a serious matter which is causing an unjustifiable increase in expenditures for repairs." The average annual replacement rate, he says, is less than 12 per cent of the fleet, indicating a continuation of an 8-year replacement cycle which is uneconomical.

Meet Clifford G. Pommer: He's Director of the Shipbuilding, Railroad, Ordnance & Aircraft Division, Business & Defense Services Administration. A 30-year veteran of General Electric Co., Mr. Pommer is on loan to the government for six months. He can be reached in Washington at room 4029, Commerce department. Phone STerling 3-9200, ext. 4818.

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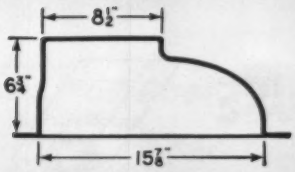
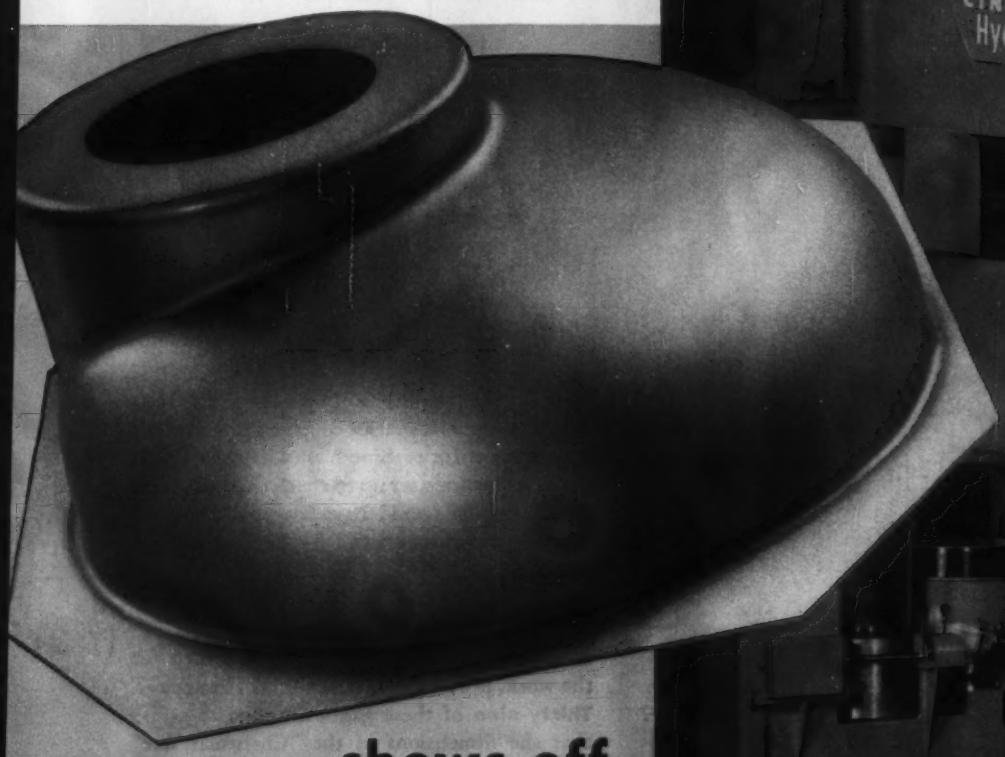
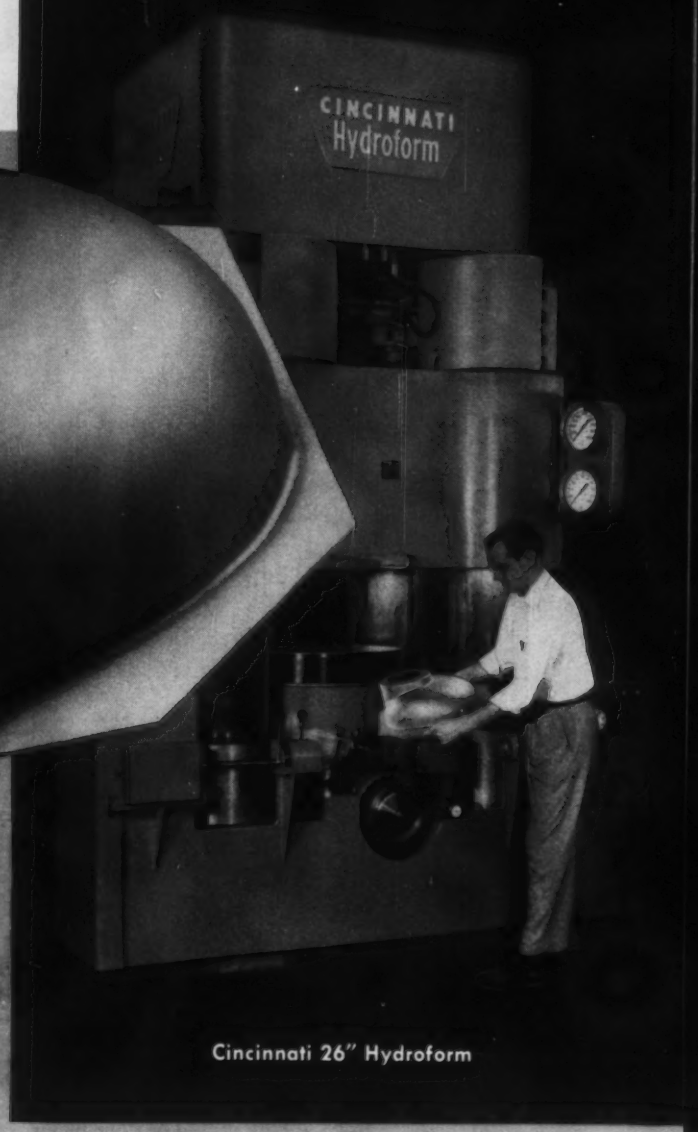
Type 302 stainless steel







Cincinnati 26" Hydroform

shows off the advantages of Hydroforming

complex stainless steel shape . . . drawn in one operation . . . using low cost, two piece tooling . . . without impairing high finish of the material.

The part, a top section of a cream separator, was drawn to desired dimensions without thin-out in *one* Hydroform operation. A 26" dia. blank having a 3½" dia. hole, was used. Tools—a male punch and a draw ring—were produced at a fraction of the cost of conventional draw tooling. As the part is a component of a food products container, finish was highly important. The part was Hydroformed without scratching or marring the polished stainless steel surfaces.

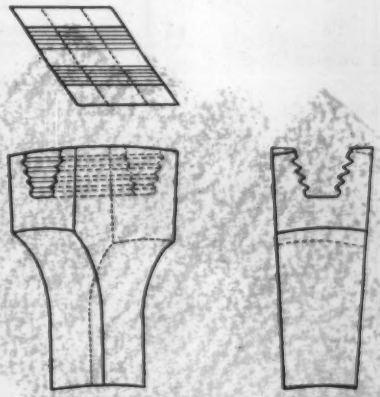
This one example is typical of the forming capabilities—the economical tooling—of Hydroforming. Can your company make use of these advantages? Call in a Cincinnati Milling field engineer. Let him assist you in evaluating Hydroforming for your manufacturing program. For a description of Hydroforming and specifications of the 8", 12", 19", 23", 26" and 32" machine sizes, write for your copy of new Bulletin M-1908.

See other new products, Booth 100, ASTE Show.

CINCINNATI Hydroform

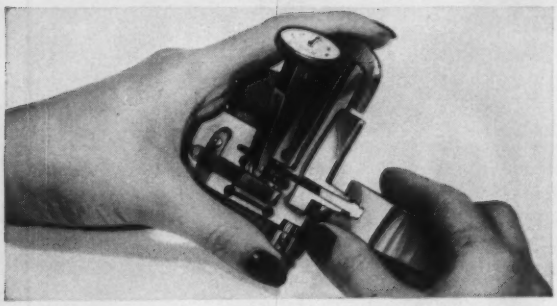
PROCESS MACHINERY DIVISION
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.

WHICH GAGE WOULD YOU USE TO INSPECT THIS PART?



An Air Gage?

An Air Gage *can* be used to gage the serrations in this insert for turbine blades. However, had the manufacturer set up to check this part with Air Gages, he would have invested $5,500.00 more than was required.



A Dial Indicator Gage?

A dial Indicator Gage, specially modified for the work, proved the economical, right answer. **Thirty-nine** of these gages are used to assure that the dimensions of the "Christmas tree" form are held to exact size. Fast and simple, this gage fulfilled all requirements for accuracy and it cost far less because an inexpensive Dial Indicator was used instead of a much higher priced Air Gage.

Most workpieces can be gaged in a number of ways. A manufacturer of Air Gages exclusively will tell you that the gaging should be done by air and that **his** gage is the one you should buy. On the other hand, a manufacturer who makes only Dial Indicators will view the job in terms of Dial Indicators and will hope to sell you **his** gage to do the work. Usually there is **one** method which is clearly best for a given job and you cannot be sure of getting the best gage if you approach for recommendations a manufacturer who makes and sells only one kind of gage.

Since Federal makes all modern gaging systems, we can be impartial in our recommendations and supply you with whichever system best meets your needs.

Our specialized background of continuous and extended experience in gaging has taught us to analyze and solve gaging problems with certainty and to render sound service to our customers.

There is a Federal representative near you, ready to give you the facts impartially. He is unbiased and will recommend the **best** gage for your work. Write or call us today.

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Federal's Solution to the Cost of Gaging:
Impartial Gage Selection
Engineering Follow-Through
Everything in Gages

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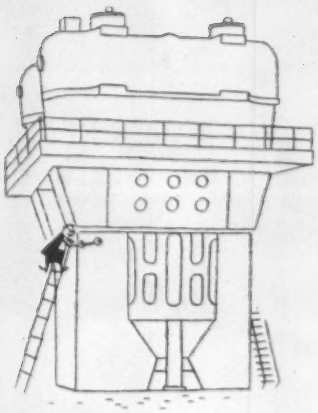
FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting, or Automation Gaging

Management at Work



Bob Perry Promotes Growth Climate

ASK Robert E. Perry, works manager for Kaiser Aluminum's extrusion division, what he believes to be the responsibilities of management. High on his list will be: "To create a climate for the maximum growth of our people."

Definition—A growth climate is defined by Bob Perry as one "where our people seek out constructive criticism and consider it a duty to contribute to each other. It is a climate in which they mitigate their weakness while greatly increasing their strengths.

"While this climate is of the utmost importance to the individual, it is even more brilliantly striking in its impact on team action. In this environment and with this philosophy of dedication the group is many times more effective and it allows us to exceed considerably performance that normally would be considered good."

By Any Name—Whatever you call Bob Perry's philosophy, it works. Of this there is plenty of evidence at Halethorpe, Md., where Kaiser Aluminum & Chemical Corp. has just completed a $25 million addition to the Air Force heavy press plant and where Kaiser is rapidly expanding its own eight-press light extrusion plant.

At Halethorpe, Perry and his associates are setting a fast pace in the booming aluminum extrusion field. They brought the 8100-ton presses into production in record time. They are producing shapes by extrusion that a few months ago would have been considered impossible. They have doubled production at a plant which already exceeded its rated capacity.

Built Staff—Perry took over at Halethorpe during a period of reassignments and promotions. He was faced with the task of building a working force and staff from men who had little experience in aluminum. How he built know-how in training sessions and blended the talents of his men to make a production team is a story his associates at Halethorpe just love to tell.

Through it all, he manages to keep all his people aware of the intense competitive situation in the aluminum industry, and to motivate his group toward higher performance.

Innkeeper—At 20, Bob Perry was the president and general manager of a prosperous inn in Michigan. At 22, he was graduated as a chemical engineer. At 30, he was superintendent of extrusion and production operations for Dow Chemical. Now at 40, he is facing new assignments in the Kaiser Aluminum empire.

US Sand Blast Hose

Dissipates Static Electricity as no other hose can!

Blasting with either sand or steel shot can build up a static electrical discharge so potent that the operator cannot handle the hose. In extreme cases the hose wall may even be perforated by this man-made form of lightning. An exclusive construction makes U. S. Sand Blast Hose *conductive*—and (more thoroughly than any other hose) prevents static build-up.

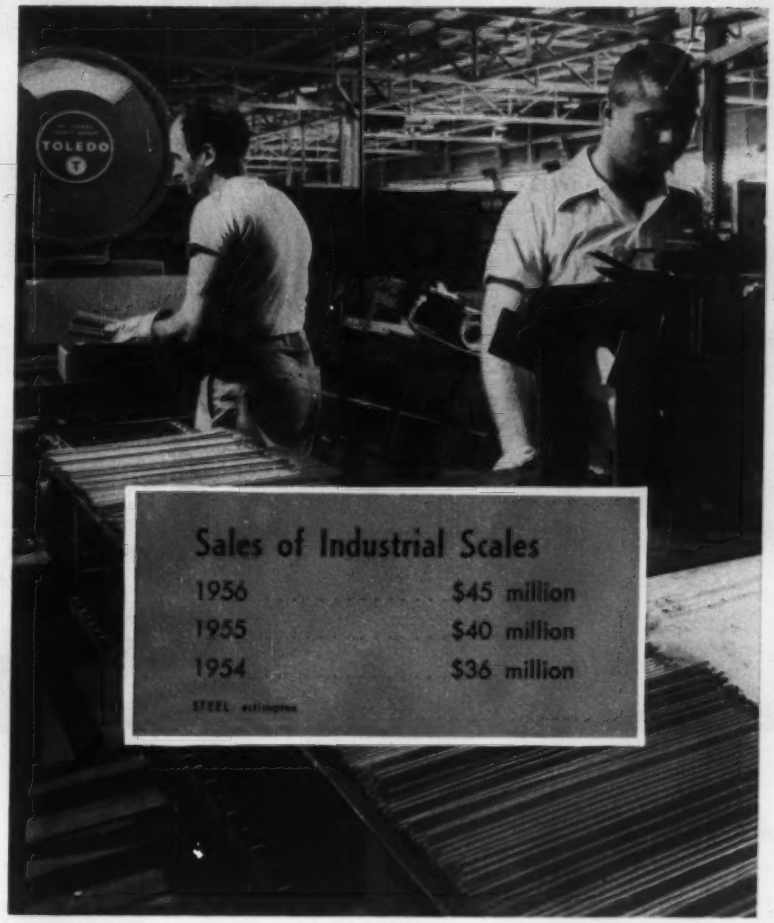
The strong carcass is built to handle any required pressures—is rigid enough to hold its shape, yet is always flexible for easy handling. High-grade rubber cover resists abrasion. Tube has the high abrasion resistance so essential in steel and shot blasting.

Obtainable at any of the 28 strategically located "U. S." District Sales Offices, or write Mechanical Goods Division, United States Rubber, Rockefeller Center, New York 20, New York.

US RUBBER

Mechanical Goods Division

United States Rubber



Westinghouse Electric Corp.

Over 40 scale makers push labor savings as . . .

Scale Sales Get Fatter

DOLLAR SALES of industrial scales will weigh up about 12 per cent heavier this year.

Another good year is expected in 1957 if this year's predicted equipment and plant additions are fulfilled. The sales trend in the industrial scale business follows industrial and commercial building by about 6 to 12 months.

The Trends—Scales are being built to cut costs. Scale manufacturers point out that the most expensive part of the weighing operation is the wages of the scale operator. The cost of the scale per weighing may be less than one-hundredth of a cent.

Arthur Sanders, executive secretary, National Association of Scale Manufacturers Inc., gives two main trends. In processing, materials are being weighed automatically as they are mixed. In packaging, products are being weighed continuously to assure proper weight. Latest development is a feedback to make corrections for any weight variations.

Crane scales are a new, labor-saving field. Hydroway Scales Inc., Detroit, makes only scale cranes, expects sales this year will be up 15 per cent.

Electronics — Fairbanks, Morse & Co. says electronic scales are finding their own applications, few are displacing mechanical scales.

Big advantage of electronic scales is that weight data can be transmitted to places remote from the weighing station. At Republic Steel Corp.'s Cleveland mill an electronic scale used in a shearing operation has been designed to reduce handling and eliminate loading and unloading of separate orders.

Maintenance—Mr. Sanders says the big problem in scale maintenance is getting the scale users to do it. Weighing equipment is able to do its job only when operating at top efficiency. Maintenance and checking for accuracy must be a continuing thing.

Mechanical scales have a 0.1 per cent accuracy rating while electronic scales are accurate to 0.25 per cent. Obsolescence is slow. Fairbanks, Morse still gets inquiries about parts for scales made in the late 1800s. Today it makes about 145 models to meet varied uses.

Floor Truck Outlook Good

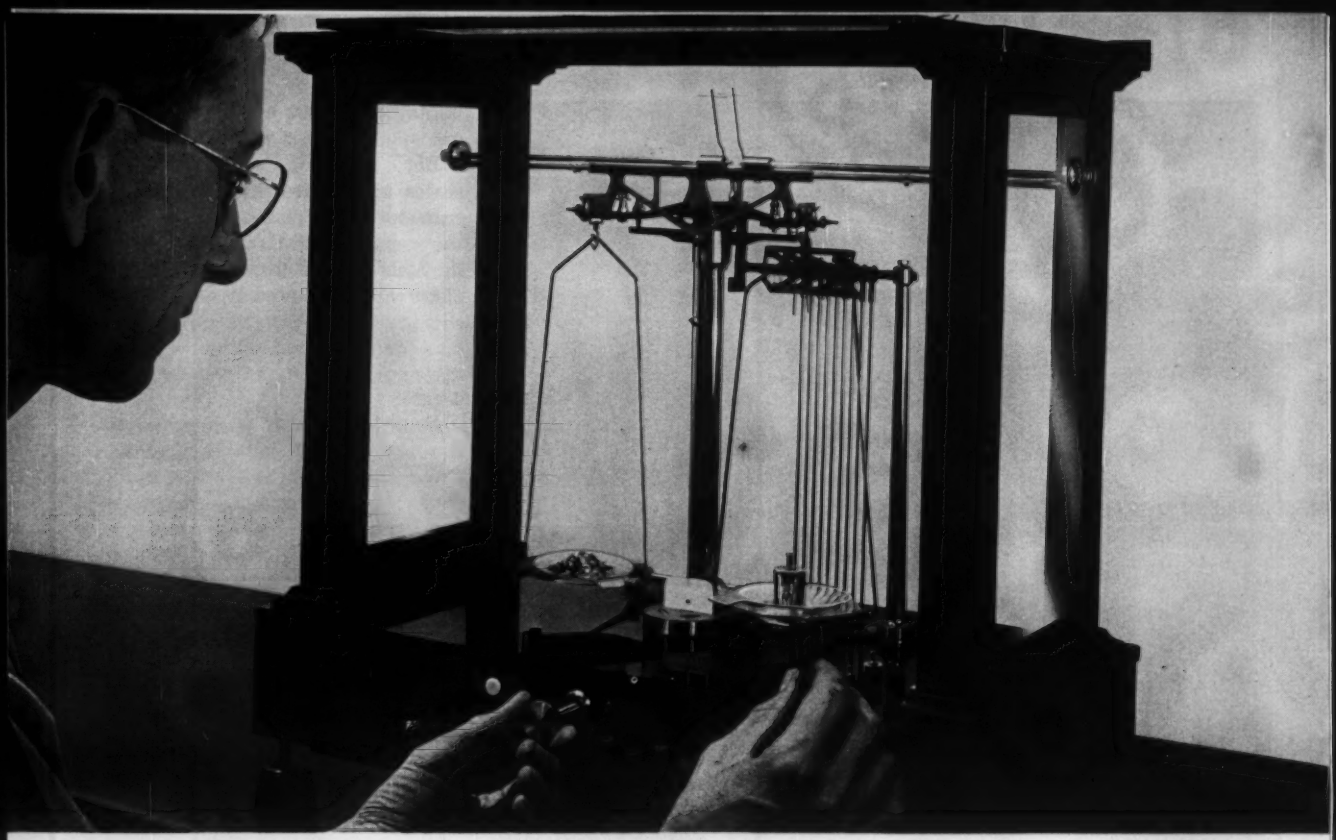
Makers of casters and floor trucks look for strong and steady business this year following the upturn of last year. Particularly strong is the demand for towline trucks.

The Caster & Floor Truck Manufacturers Association (it represents about 85 per cent of the caster business and about 60 per cent of the floor truck business) is backing standardization.

In the last six months, standards have been set up on molded, metal and plastic wheels. As part of a three-year program, standards have been established for trailer trucks, two-wheel hand trucks and dead skid platforms.

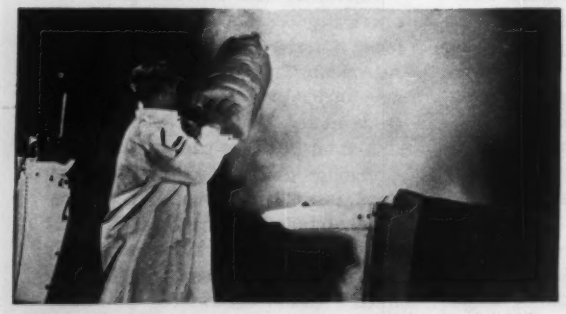
Currently the association is cooperating with the Regular Common Carrier Conference of the American Trucking Association to develop standards for towline equipment.

A final draft of caster standards is being distributed to industry members for approval. It will reduce 400 sizes of casters to about 20 standard sizes. However, many of the present sizes will be made until customers switch to standard sizes.



How Great Lakes Steel *weighs* quality

IN A QUALITY CONTROL LABORATORY, chemical analyses such as these, are run on every heat. Then . . .



THE ANALYSES are telautographed immediately to the melter so he can add elements to meet customer's requirements.

How much does quality weigh? In the photograph above, a test sample is being weighed for chemical determinations. Tests like this give our open-hearth operators a running check on molten steel while it is still in the furnace; enable them to pour heat after heat of high and uniform quality.

In every department at Great Lakes Steel, from raw material docks to delivery of finished steel, the emphasis is on quality—on seeing that customers receive steel that meets their particular requirements.

Do you have a manufacturing problem involving flat-rolled steel? A call to Great Lakes will make available to you the experience of our entire organization.

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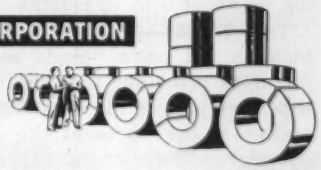
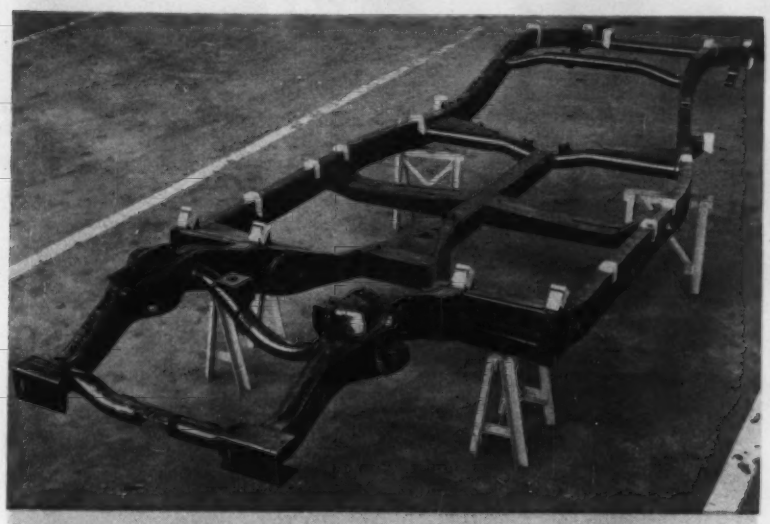


District Sales Offices: Boston, Chicago, Cincinnati, Cleveland, Grand Rapids, Houston, Indianapolis, Lansing, Los Angeles, New York City, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Toledo, Toronto.



Continental Mark II Frame Characteristics

	Maximum Torsional Rigidity (lb-ft/deg)	Gross Frame Weight (pounds)	Torsional Efficiency (lb-ft/deg per lb)
Experimental Frame No. 1	3189	594	5.36
Experimental Frame No. 2	2466	436	5.65
Production Frame	3013	535	5.63
1956 Lincoln Hardtop Frame	1995	358	5.57

Source: Continental Division, Ford Motor Company

This Continental Mark II frame gives a clue why . . .

Detroit Looks at Ladders

AMONG the changes planned for 1957 model cars will be some different types of automobile frames.

The big push behind frame changes stems from stylists who are demanding lower clearance with no loss of seating capacity or headroom. This means the floor pan must be lowered. The X-frame or narrow box frame doesn't permit such a change. Engineers have been looking for something else.

Pro and Con—Although a lot of the current talk centers around unit body construction as typified by American Motors Corp. cars, the industry looks askance at the high retooling costs needed for that complete a changeover.

A more likely prospect will be the ladder type frame which embraces some of the characteristics of the X-type or box frame and unit body construction.

Theory—The pure ladder frame is nothing more or less than a center rail with outriggers projecting out to support the body and running gear. The rocker panels or sides of the body are reinforced with strip steel or semiboxed members which replace conventional frame side rails.

Actually this frame style in its simplest form doesn't give enough torsional rigidity to heavy-built American cars. So what the engineers probably will come up with is a modification.

Mark II—Continental Division, Ford Motor Co., has a more probable answer in its semi or double ladder frame. A closer look at this construction will give an idea of what some carbuilders will shoot for in 1957 and 1958 models.

Continental wasn't faced with any retooling problems when it started designing the Mark II. About the biggest requirement was set by stylists who demanded a maximum over-all height of 58-in. This led naturally to development of a ladder frame which would permit lower clearance.

Bruce Clark, Continental engineer, points out: "The double ladder frame permits low over-all height with no reduction in seating clearance. It also has more torsional rigidity than conventional frames."

Stretch—The two side rails are moved out to within shimming distance of the rocker panels. These are called discontinuous side rails because they have a 16-in. right angle offset behind the front wheels. This disjointed construction results in four-point body mounting at the cowl line which greatly strengthens body-frame assembly.

A center rail replaces the usual X-brace and a Y extension joins it just behind the cowl line. The Y-section provides room for the transmission. Reinforcing gussets strengthen these joints. Continental experimented with two other frames before this Y-joint type was developed.

Seven tubular cross braces extend through the side rails and front extension. They are welded on both sides of each rail to make an extra strong joint. Now there's room for foot wells to be lowered to provide plenty of seating clearance and still keep within the 58-in. height requirement.

To get the drive shaft tunnel

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Medalist Opens New Series in Mercury's Stable

High sales have caused Mercury to extend its Medalist two-door sedan into a separate low-priced series. Two and four-door sedans and a hardtop coupe make up the group. Body specifications are the same on all 17 models of the Mercury line

as low as possible, Continental uses a three-joint drive line, something other automakers are keeping in mind. This type of unit has only been used before on taxicab limousines and on some custombuilt jobs.

The end result is a frame which is slightly heavier than conventional types, but one which gives better torsional rigidity.

Easy Switch—Productionwise, a change to ladder frame construction would mean relatively few modifications on assembly lines. That's probably the biggest reason it will be favored for the future.

More seam welders might be needed and some basic die changes will have to be made in floor pans, but that's about it. In this era of two-year face lifts, stamping dies are revamped anyway and the ladder frame will prove no obstacle to stylists. In fact it will give them more room to play with.

Unit Body—Now how does this stack up with unit body construction? The unit or monoframe starts with a floor pan. Structural members and body panels are welded right to it with bracing and framing to give added strength.

Lack of a separate frame reduces total body weight and the integral construction certainly gives greater torsional rigidity. All this adds up to a safer ride, a big selling point for American Motors, the only U. S. carbuilder using this frame style.

But here are some inherent problems from a production standpoint:

1. Unit body construction means that major face lifts would require costly retooling—something no autobuilder wants to get into.

2. Parts suppliers would have to revamp manufacturing systems. Budd Co., Philadelphia, for example, no longer would make frames. They probably would switch to a sub unit assembly of the floor pan and side members. Again, more retooling costs — particularly in sheet metal stampings.

3. Assembly lines would have to be changed to accommodate different conveyor systems and a separate type of assembly line would have to be set up to handle running gear units.

All told, the odds against a changeover to this type of framing add up to more money than the industry wants to put out. So even though the unit body is stronger (and stiffer), chances are American Motors will remain the sole user—and it isn't sorry.

U. S. Auto Output

Passenger Only

	1956	1955
January	611,190†	659,719
February		675,769
March		794,188
April		754,007
May		724,891
June		649,372
July		659,979
August		614,392
September		461,592
October		517,669
November		748,559
December		682,698
Total		7,942,983†

Week Ended	1956	1955
Jan. 14	149,995	155,109
Jan. 21	144,729	161,150
Jan. 28	135,586	160,666
Feb. 4	140,582	164,265
Feb. 11	136,308	168,059
Feb. 18	129,934†	173,482
Feb. 25	128,000*	171,188

Source: *Ward's Automotive Reports*
†Preliminary *Estimated by STEEL

Chevvy Expands Again

Chevrolet Motor Division, General Motors Corp., will build its largest assembly plant about 12 miles northwest of Youngstown.

T. H. Keating, general manager, says the automated plant will be able to produce 75 cars and 30 trucks an hour. It should be in operation by the fall of 1957.

Trucks — Meanwhile the company is invading the heavier-duty truck field with a series of two-and-a-half-ton models.

These are in addition to the one-half to two-ton trucks announced earlier. Capacities range up to 32,000-lb maximum gross vehicle weight and 50,000-lb gross combination weight. Total truck combinations for Chevvy now are 105 models on 23 different wheelbases.

The heavy duty units will be built at the Willow Run truck assembly plant.

Exhaust Notes

It's rumored that Fisher Body Division, General Motors Corp., will spend about $27 million on retooling in 1956—most of it for stamping dies. . . . Ford Motor Co. is robbing Peter to pay Paul. The company has reduced its "phantom freight" destination charges as much as $49 for Fords. But it announces a raise in dealer prices which just about covers the differences in some cases . . . Chrysler Corp. will operate its Jefferson and Kercheval (Detroit) assembly plants on a one shift basis starting today (Feb. 27). The change will affect 1000 employees.

NUMBER 1 OF A SERIES

PRODUCTION SHORT CUTS WITH

ZINC DIE CASTINGS

The RAMBLER puts on its best front!

The completely new 1956 Rambler—by American Motors—features a unique front end assembly styled to endow this compact, economical car with a massive, forward-thrusting look. And this assembly graphically illustrates why ZINC Die Castings are so widely specified by design engineers in and out of the automotive industry.

As you see, the ZINC Die Cast grille is attached to a sheet metal frame before mounting on the car. The grille top molding and the inboard headlamp bezels are then attached to cover the frame and complete the front end. Because such unusual shapes can be die cast, only four castings are required in the assembly (plus the two running-light bezels in the fenders).

Send for your copy

The Rambler front end assembly is further simplified by casting the steel mounting bolts as inserts in the back of both the grille and the molding. These precisely located fastening elements, plus the overall dimensional accuracy of the castings, assure perfect fits every time. Add easy finishability (all of the castings are beautifully chromium plated) and you have the principal reasons why ZINC Die Castings are specified by American Motors engineers.

For possible answers to *your* particular production problems, send for our brochure and contact any commercial die casting company.

The New Jersey Zinc Company, 160 Front St., New York 38, N. Y.

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FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are based on

HORSE HEAD SPECIAL (99.99 + % Uniform Quality) ZINC

RB&W FASTENERS - *Strong Point of any assembly*

Putting the squeeze on wire for a better bolt or nut

HERE's wire rod squeezing through a succession of drawing dies at RB&W. Why draw wire when it can be purchased in standard dimensions? Because it's a form of quality control that helps make better fasteners.

RB&W has a whole battery of machines to handle round and rectangular stock, even up through 1-inch size. Above you see Dominick DeCarlo keeping a keen eye on rod destined to become cold upset bolts. He's typical of many RB&W people . . . been with the company over 15 years.

He's doing a job that more accurately sizes the material . . . strengthens it . . . assures its uniformity . . . permits control of the coating used and, therefore, of the finish obtained.

It's this combination of facilities, experience and quality control in action in every RB&W plant that assures you more fastener quality for your money . . . a reliable source of supply . . . and strong fasteners that never let you down.

Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N.Y.

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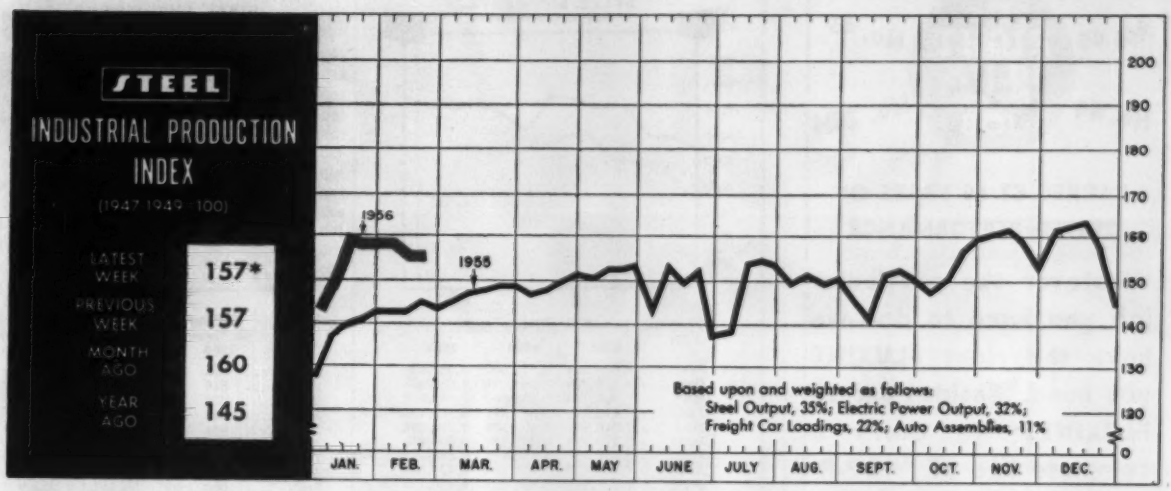
110th year

Plants at: Port Chester, N. Y., Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; Seattle. **Distributors** from coast to coast.



*Week ended Feb. 18

Business Will Maintain High Level

BUSINESS in the first half will remain steady at a high level, but towards midyear, there'll be a slight rise. Seven prime barometers indicate this.

They are: Business failures; new incorporations; new orders for durable goods industries, residential building contracts, commercial and industrial building contracts; average hours worked per week in manufacturing industries; and wholesale prices. These factors precede fluctuations in general business 2½ to 10½ months.

Balance Out—The plusses and minuses just about cancel each other. For instance, business failures in the first seven weeks of 1956 outdistance failures for the corresponding 1955 period by 1679 to 1572. But new incorporations for 1955 were well ahead of 1954, and the trend is still up. December, at 11,527, was the highest month in second half of last year, says Dun & Bradstreet Inc.

New orders for durable goods industries, which precede a business peak by about seven months, in December showed a continuation of the climb throughout 1955 by registering $15.6 billion, seasonally adjusted. Indications are January will show up at about the same level. Wholesale prices, other than farm and foods, are also on the upgrade. January registered 120.2 (1947-1949=100) compared with 119.8 for December, says the Bureau of Labor Statistics. The bureau also says that average hours worked per week in manufacturing in January came to 40.6, down from 41.3 hours in December. The trend here will be down again in February.

Seasonal Variations — Construction is a question mark right now. F. W. Dodge Corp.'s figures for 37 eastern states indicate value of awards and floor space contracted for are both down from December in residential and nonresidential building. How much of this is a seasonal decline is hard to determine. However, a comparison of the figures with year-ago values

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,425[1]	2,433	2,191
Electric Power Distributed (million kw-hr)	11,400[1]	11,343	9,912
Bitum. Coal Output (1000 tons)	10,200	9,825	8,690
Petroleum Production (daily avg—1000 bbl)	7,000[1]	7,046	6,767
Construction Volume (*ENR*—millions)	$268.3	$539.9	$193.9
Auto, Truck Output, U. S., Canada (*Ward's*)	161,183	165,110	196,644
TRADE			
Freight Car Loadings (1000 cars)	686[1]	684	655
Business Failures (Dun & Bradstreet)	220[1]	236	205
Currency in Circulation (millions)[3]	$30,247	$30,219	$29,743
Dept. Store Sales (changes from year ago)[3]	+5%	+5%	0%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$17,748	$19,678	$21,066
Federal Gross Debt (billions)	$279.7	$279.7	$278.3
Bond Volume, NYSE (millions)	$18.9	$19.2	$20.5
Stocks Sales, NYSE (thousands of shares)	10,597	10,311	16,818
Loans and Investments (billions)[4]	$84.1	$84.7	$84.9
U. S. Govt. Obligations Held (billions)[4]	$28.5	$28.8	$35.3
PRICES			
STEEL's Finished Steel Price Index[5]	209.10	209.10	194.53
STEEL's Nonferrous Metal Price Index[6]	272.6	267.9	226.7
All Commodities[7]	112.1	111.9	110.3
Commodities Other Than Farm & Foods[7]	120.1	120.2	115.4

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1956, 2,461,593; 1955, 2,413,278. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100

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No. 44 No. 28H

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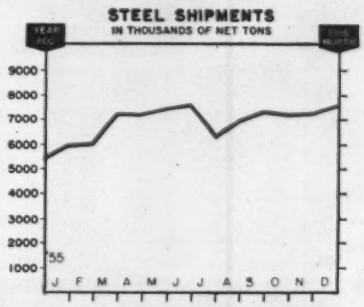
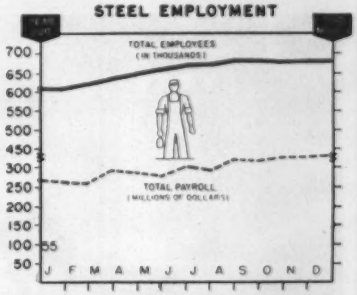


	Net Tons 1955	1954	1953
Jan.	6,009,958	5,727,600	7,067,636
Feb.	6,119,900	5,364,978	6,533,227
Mar.	7,268,795	5,583,690	7,436,919
Apr.	7,279,321	5,287,972	7,162,460
May	7,540,889	5,423,168	7,209,396
June	7,770,213	5,887,488	6,950,059
July	6,250,597	4,490,179	6,582,513
Aug.	7,053,615	4,681,242	6,498,605
Sept.	7,378,247	5,004,222	6,400,757
Oct.	7,216,821	5,035,364	6,726,850
Nov.	7,247,994	5,240,209	5,903,980
Dec.	7,580,943	5,448,649	5,684,920

American Iron & Steel Institute

Charts copyright, 1956, STEEL



	Employment in Thousands 1955	1954	Payroll in Millions 1955	1954
Jan.	605	645	$258.8	$251.3
Feb.	616	636	255.1	236.6
Mar.	630	621	288.2	249.7
Apr.	643	609	282.0	232.6
May	654	606	249.1	234.4
June	667	606	298.4	236.4
July	676	608	296.8	232.8
Aug.	680	601	320.7	238.8
Sept.	680	597	317.1	234.6
Oct.	678	596	325.1	244.7
Nov.	680	599	326.1	247.7
Dec.	682	605	330.6	262.2

American Iron & Steel Institute

indicates 1956 is still ahead.

The scoreboard for the seven factors reads: Three uptrends and four down. It all depends on how you weight the figures in compiling a composite, but the final analysis indicates an even-Stephen condition.

On the Limb—The Value Line Investment Survey, published by Arnold Bernhard & Co. Inc., New York, uses several of these factors in combination with a stock market composite and bank debits and loans to come up with the same conclusion. The Value Line business forecaster trend line historically has been four to six months ahead of the Federal Reserve Board's production index. The Value Line business forecaster leveled off during second quarter last year, stayed that way for four or five months, and started a small climb during fourth quarter. The survey is quick to point out that the position now is in delicate balance, and a sudden shift downward in even one of the components could cause the trend line to drop also. But on the assumptions that business will follow the level outlined above and that the Value Line business forecaster will continue to precede the FRB index, it looks like there will be a slight upturn in second half.

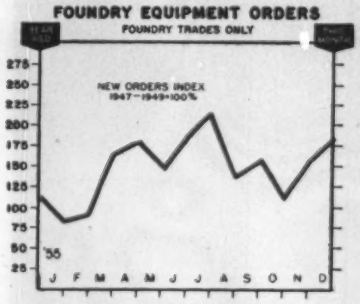
STEEL's Index Eases Off

STEEL's industrial production index tends to support the evidence of an even-keel economy. With the exception of the holiday-shortened first week of the year, there has been a variation of only four points on the trend line in 1956. After holding at 160 (1947-1949 = 100) for three weeks, the index dipped to a revised 157 for the week ended Feb. 11, and preliminary figures for the following week indicate another 157. Of the four elements making up the index, all but freight car loadings contributed to the decline.

Evidence Mounts for Good Year

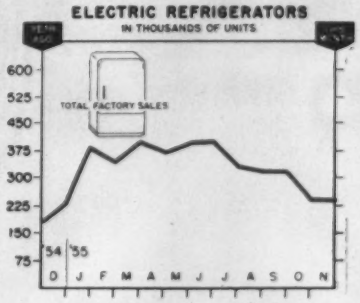
The FRB industrial production index held at 144 (1947-1949 = 100) in January, same as in December, giving further indication of a high-level economy. Except for autos, durable goods maintained the previous level while production of nondurable goods and minerals continued at peak rates.

Other bright spots for 1956 were pointed out to the Rochester, N. Y., Purchasing Agents Association by Harold C. Passer, economist analyst



	1955	1954	1953
Jan.	81.0	173.8	99.6
Feb.	90.4	99.9	97.5
Mar.	163.6	82.7	132.2
Apr.	178.6	125.3	111.8
May	145.7	80.8	182.1
June	186.8	86.4	156.4
July	213.4	68.8	158.9
Aug.	134.0	75.6	235.5
Sept.	156.7	68.3	127.7
Oct.	108.6	147.5	87.1
Nov.	154.4	61.4	149.4
Dec.	183.9	113.9	160.8

Foundry Equipment Mfrs. Assn.



Total Factory Sales—Units	1955	1954	1953
Jan.	381,197	344,401	325,186
Feb.	338,575	334,122	377,605
Mar.	392,774	330,641	368,498
Apr.	364,298	280,900	366,951
May	390,385	282,164	317,667
June	395,936	303,127	343,114
July	323,240	325,061	298,838
Aug.	310,789	256,665	232,981
Sept.	313,143	271,859	231,224
Oct.	235,945	190,753	179,749
Nov.	234,786	175,557	139,563
Dec.	.....	228,612	197,102
Total	.....	3,323,562	3,378,478

National Electrical Mfrs. Assn.

for Eastman Kodak Co. He said consumer income could be raised 5 per cent above 1955 by a probable round of wage increases; new minimum wage increase next month; continued high earnings of industry in general and a probable income tax reduction. He predicted industry will increase its spending for new plant and equipment by 12 per cent this year. The labor force will increase 600,000 Mr. Passer believes. He does not discount the possibility of slight corrective recessions, but such periods should be of short duration and will not affect the long term.

R. E. Reimer, vice president and secretary of Dresser Industries Inc., goes along with this school of thought. "Based upon the announced plans of the oil, gas and chemical industries for adding to facilities during 1956 and upon a continued high level of business activity generally, we expect that Dresser Industries will increase its sales by more than 10 per cent in 1956," he told the St. Louis Society of Financial Analysts.

Handling Equipment To Boom

Adding fuel to the fire, the Material Handling Institute Inc. predicts the industry will increase its business 10 per cent in 1956 over record-breaking 1955. Material handling equipment manufacturers' bookings last year were 21.46 per cent higher than in 1954. This actually represented an increase of more than 35 per cent in bookings from private industry because government purchases were down. The institute says the increased business this year will be caused by: 1. Industrial expansion. 2. Increased production in existing facilities. 3. Anticipated labor shortages.

Loadings Lead by 8 Per Cent

The outlook for freight car loadings this year is clouded by conflicting predictions from the railroads. Union Pacific anticipates a slight decline in freight traffic tonnage during the first half while Erie officials expect slightly better gross traffic for the year. Part of Union Pacific's pessimism may stem from the fact that one of its biggest tonnage items is lumber products for homebuilding, which may be off a bit this year. But the fact remains that loadings for the first six weeks of the year are running 8 per cent above the similar 1955 period, according to the Association of American Railroads.

Even the smallest size Reamers are Standard with L&I

The Reamer Specialists

LAVALLEE & IDE, INC.

CHICOPEE, MASS.

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. . . Downingtown Iron Wks. gen. mgr.

DENNIS E. HARVEY
. . . Magcoa v. p.-gen. sales mgr.

SAMUEL J. CHILDS
. . . Weston Electrical Instrument v. p.

W. L. Killen was made general manager, **Downingtown Iron Works,** Downingtown, Pa., a division of Pressed Steel Tank Co. Mr. Killen was works manager. He joined Downingtown in August, 1955, and prior to that was general manager of Chicago Steel Tank Co. **T. G. Ashworth** was elected treasurer, **J. R. Piersol,** secretary.

Donald L. Rheem was elected chairman of **Rheem Mfg. Co.,** Chicago. Formerly executive vice president, Mr. Rheem was a cofounder of the company. **A. L. Walker** was elected executive vice president and continues to serve as vice president in charge of Rheem International. **Emerson S. Ronk** joins the firm as vice president-administration, a new post.

John A. Proven was elected executive vice president of **Millers Falls Co.,** Greenfield, Mass. He was a vice president of Porter-Cable Machine Co., Syracuse, N. Y., and of Porter-Cable Power Tools Ltd., Canada.

J. Robert Sansom was made manager of distributor sales, Dexion Division, **Acme Steel Co.,** Chicago.

C. W. Mellette was made general sales manager of **Waterbury Mfg. Co. Division,** Chase Brass & Copper Co., Waterbury, Conn. He succeeds **J. Walter McGarry,** retired.

Dennis E. Harvey, former vice president in charge of the Washington office, was elected vice president-general sales manager of **Magnesium Co. of America,** East Chicago, Ind. **Ambrose L. Duggan** was made assistant general sales manager. Other appointments include **R. L. McKee** as sales manager, fabrication division; **Gordon F. Ramer,** manager of direct sales, materials handling division; **W. R. Gow,** manager of dealer sales, materials handling division; and **George H. Bouton,** sales manager, Tobey Aluminum Division.

Kevney O'Connor Jr. was made sales manager of **Cooper Alloy Corp.'s** aircraft product division at Clark, N. J. He was senior buyer of aircraft forgings and welded rings for the jet division of Thompson Products Inc. **Robert H. Miller** was made purchasing agent of Cooper Alloy.

C. J. Ramsburg Jr. was made manager of tubular sales for **National Supply Co.,** Pittsburgh. He succeeds **Edwin A. Booth,** resigned. Mr. Ramsburg was sales manager-welded products.

George W. Evens was made works manager, a new post at **La Salle Steel Co.,** Hammond, Ind. He assumes many of the duties of the late **Theodore S. See,** vice president-operations. Mr. Evens was general superintendent.

Weston Electrical Instrument Corp., Newark, N. J., subsidiary of Daystrom Inc., elected **Samuel J. Childs** vice president-general manager in charge of manufacturing and production. He was formerly president of the Daystrom Furniture Division. **John D. MacNamara** was made field sales manager.

George L. Ogdin Jr. was made general sales manager, Fulton Sylphon Division, **Robertshaw-Fulton Controls Co.,** at Knoxville, Tenn. **Wilbur Jackson,** a company vice president, was named general manager, Grayson Controls Division, Long Beach, Calif. **Robert L. Wehrli** was made general manager of the Aeronautical Division, Anaheim, Calif.

Albert F. Hoecker was made quality manager of **Ferry Cap & Set Screw Co.,** Cleveland. **W. G. Eikenbary** joined the firm as distributor sales manager. He was sales representative with Arro Expansion Bolt Co.

Clark Controller Co., Cleveland, named **E. R. Jung** (vice president) to head its new marketing division as vice president-marketing. **Robert Whitehill** was named general sales manager and **W. R. Heckman** fills the new post of manager of industry sales. **Clarence Atkins** was made manager, renewal parts division, to

DAVID W. MYERS
. . . *Producto Machine v. p.*

JOHN A. GUDZINAS
. . . *Mannesmann-Meer purchasing agent*

DAVID D. WALLACE
. . . *Clearing Machine v. p.*

replace **Victor Macha**, who also fills a new post of director of education and training.

David W. Myers, controller of **Producto Machine Co.**, Bridgeport, Conn., was appointed vice president.

Continental Can Co. appointed **L. Ylvisaker** general manager of the metal division research and development department at Chicago, effective Mar. 1. He is succeeded as director of staff for the metal division in New York by **E. L. Hazard**, now general manager-northeastern district, eastern division. **W. K. Neuman**, now general manager-sales, was appointed manager of new products. **R. S. Hatfield**, now general manager-north central district, central division, Chicago, was made general manager of sales. Mr. Neuman and Mr. Hatfield will have headquarters in New York.

Kaiser Aluminum & Chemical Corp. named **Haskell J. Ross** plant manager at its Halethorpe, Md., Works. **Robert E. Perry**, who was works manager at Halethorpe, will be assigned additional responsibilities within the corporation and will transfer to home offices in Oakland, Calif., later this year.

A. B. Farquhar Division, Oliver Corp., York, Pa., named **Gilbert S. Wright** chief engineer and **Paul J. Chaney** sales manager, press and special machinery department.

John A. Gudzinas was made purchasing agent at **Mannesmann-Meer Engineering & Construction Co.**, Easton, Pa.

Alan Wood Steel Co., Conshohocken, Pa., appointed **T. D. Owens** manager, foundry coke and pig iron sales and **W. J. Patterson** manager, industrial coke and chemical sales.

A. M. Byers Co., Pittsburgh, elected **J. Frederick Byers Jr.** executive vice president and **Albert R. Frame** vice president-operations. Mr. Byers has been vice president since 1954. Mr. Frame was general manager-operations.

David D. Wallace was elected a vice president of **Clearing Machine Corp.**, Chicago. He continues as assistant to the president, in charge of foreign operations.

Frank W. Zurn was named vice president-manufacturing of **J. A. Zurn Mfg. Co.**, Erie, Pa. **Paul I. Benton** was made plant manager in charge of production and personnel relations.

J. W. Smith was made eastern sales manager, industrial products division, **Goodyear Tire & Rubber Co.**, Akron, to replace **O. A. Schilling**, recently promoted to manager, industrial products de-

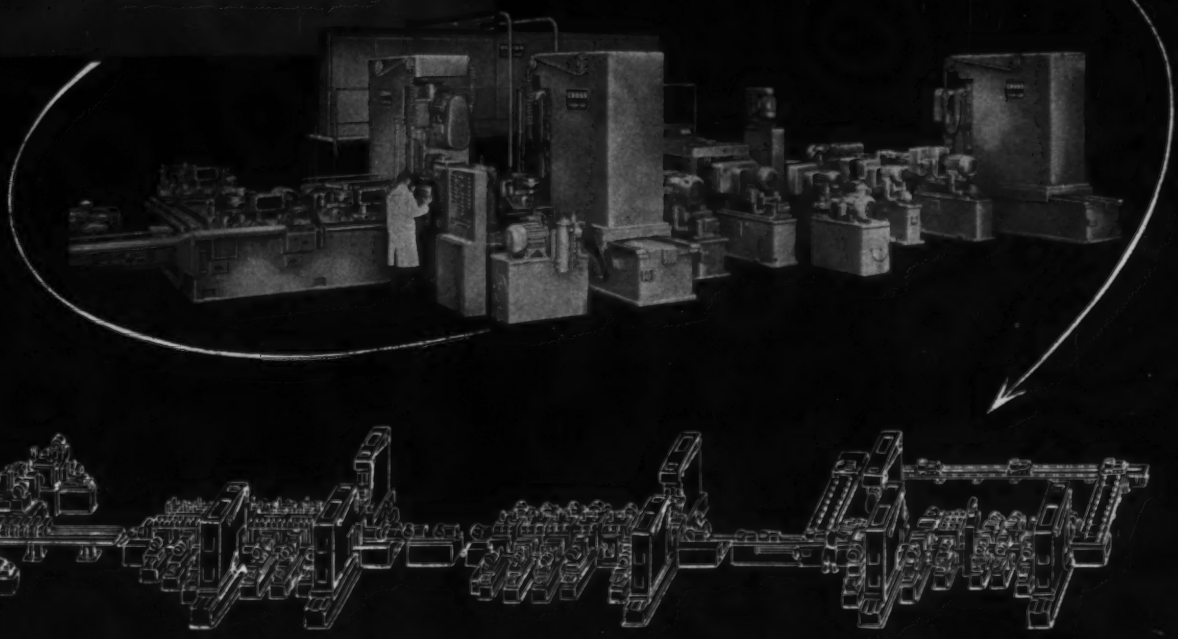
J. FREDERICK BYERS JR.

ALBERT R. FRAME

. . . *executive posts at A. M. Byers Co.*

Tractor Differential Housings from Rough Castings to Assembly!

Another Transfer-matic by Cross



The new Cross Special Machine above is one of four sections which constitute a complete production line. Together, they process 46 tractor differential housings per hour from rough foundry castings to assembly. The line is 225 feet long with 31 stations. It performs 313 operations, including 19 milling, 7 cross-facing, 110 drilling, 17 boring, 72 chamfering, 4 spot-facing, 8 reaming and 76 tapping.

Like all Cross machines, the parts—even tooling details—are made to interchangeable tolerances for fast, easy maintenance and to provide flexibility for model changes—an important Cross advantage both from the standpoint of operating costs and investment. This production line is another example of Cross Sectionized (Segmented) Automation.

Established 1898

THE CROSS CO

First in Automation

DETROIT 7, MICHIGAN

DONALD ROBERTSON
. . . Colonial Broach & Machine p. a.

C. G. REAVIS
. . . heads new Norris-Thermador plant

JAMES T. MORRISON
. . . White Motor purchasing dir.

partment. **J. L. Sinclair** was made Chicago district manager for the division and is replaced as Cleveland district manager by **R. J. Ario.**

Donald Robertson was appointed purchasing agent and **Jack White** assistant sales manager for **Colonial Broach & Machine Co.**, Detroit.

Walter Kaiser was made assistant chief engineer of **Thomson Electric Welder Co.**, Lynn, Mass.

E. Walter Hammer Jr. was made chief engineer, **United Mfg. Co.**, Cleveland. He also will supervise the quality control department. For the last ten years, Mr. Hammer has been with the Franklin Institute Laboratories, the last year as chief of the machine design and development section for research and development.

C. G. Reavis joins **Norris-Thermador Corp.** as manager of its new Texas division plant at Waco. He was works manager, Sterling Wheelbarrow Co.

Gaylord T. Stowe was elected vice president in charge of refractory sales and engineering, **E. J. Lavino & Co.**, Philadelphia. He succeeds **Raymond E. Griffith**, retired.

American Welding & Mfg. Co., Warren, O., appointed **Arthur W. Kennedy** superintendent, rough ring production and **R. E. Goodman** superintendent, finishing operations.

Sharon Steel Corp., Sharon, Pa., named **L. H. Wilson** manager of its new sales division formed to market large forging quality ingots and semifinished steels. He was assistant to the general sales manager.

James T. Morrison was made director of purchasing of **White Motor Co.**, Cleveland. He has been with Baldwin - Lima - Hamilton Corp. for the last 20 years. Since 1946 he served as purchasing agent at its Eddystone, Pa. division.

Thorn Pendleton was named president of **Trumbull Mfg. Co.**, Warren, O., to succeed **M. L. Derge**, now chairman of the board.

Louis Santucci was made sales manager for **Chicago Threaded Fastener Co.**, Chicago. He succeeds **Al Rottner**, recently made vice president-sales.

H. Stanley Butterworth was made assistant general manager of **Jones & Laughlin Steel Corp.'s** container division, New York. He was manager of the New Orleans plant.

OBITUARIES . . .

Charles D. Briggs Sr., chief engineer at **O. S. Walker Co. Inc.**, Worcester, Mass., died Feb. 9.

Sigurd B. Swanson, 59, president, **Apex Tool Co.**, Bridgeport, Conn., died Feb. 11.

George L. Palmer, 54, vice president and controller, **Schemenauer Mfg. Co.**, Toledo, O., died Feb. 9.

Alfred Sharp, 51, export sales director at **Glenn L. Martin Aircraft Corp.**, Baltimore, died Feb. 7.

Benjamin C. Wells, 63, superintendent of blooming mills at **Republic Steel Corp.'s** Canton, O., steel plant, died Feb. 12.

Arthur G. McKee, 85, founder of **Arthur G. McKee Co.**, Cleveland, died Feb. 19. He was president until 1946 when he became chairman of the advisory board.

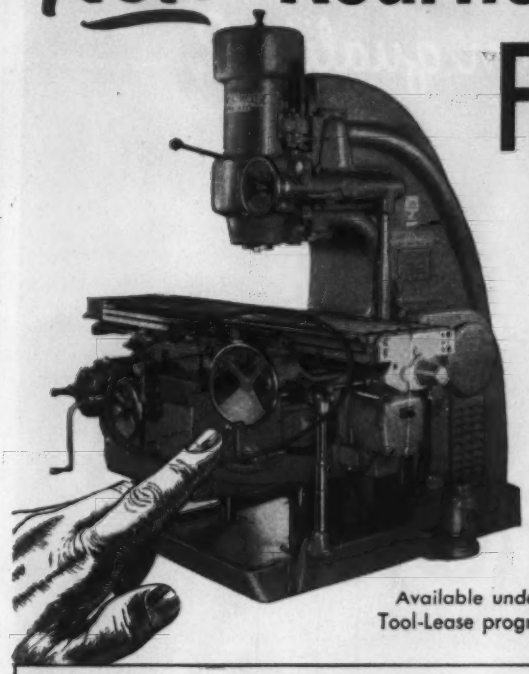
Winfield H. Smith, 64, chief tool designer for **Evinrude Motors Division**, Milwaukee, Outboard Marine & Mfg. Co., died Feb. 10.

F. A. Cohen, 72, scrap iron and steel broker with **D. R. & F. A. Cohen Co.**, Chicago, died Feb. 13.

Joseph S. Gay, 50, partner in **Gay Sheet Metal Dies**, Buffalo, died Feb. 4.

Rudolf Unfug, architect-engineer for **Rust Engineering Co.**, Pittsburgh, died Feb. 1.

Now Kearney & Trecker has Front-Mounted *(convenience-engineered)* Handwheel



Available under Tool-Lease program

Standard equipment on new TF Series milling machines — front-mounted for faster table settings ... positioned to prevent errors

THE front-mounted table handwheel is a standard feature on all Kearney & Trecker new TF Series, knee-type milling machines — Plain, Universal and Vertical. Mounted on the right front of the saddle and projecting diagonally, the newly positioned handwheel is a part of Kearney & Trecker's up-front central control grouping.

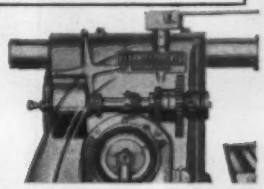
Because the handwheel is ideally located so as to simplify operation of the machine, the operator makes table settings more accurately — in less time and without leaving his normal operating position. It measurably reduces operator fatigue.

In addition, the new TF's give you a combination of more outstanding design and operating features (illustrated at left) than any other knee-type milling machine on the market today. They're available in five sizes — No. 2 to No. 6 from 10hp to 50hp.

For complete specifications, and what these TF's can do for you, see your nearest Kearney & Trecker representative, or write direct to Kearney & Trecker Corp.

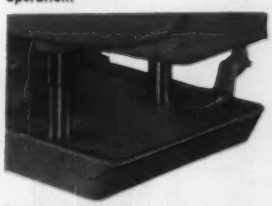
5 more reasons why TF Series milling machines are so easy to operate

Heavier, Wider, One-Piece Knee — The TWIN SCREW arrangement supports the heavier, larger knee. Span and length of ways is increased considerably, providing fuller saddle support . . . lasting accuracy . . . substantial reduction of way and gib wear.



Three-Bearing Spindle — Complete assembly consists of three heavy-duty bearings, flywheel, a train of wide-faced forged steel gears. Rigidity of spindle unit contributes to increased cutter life, better finish and quieter operation.

Double "Vibra-Void" Overarms — Two solid steel bars, mounted completely through column, void vibration at source, afford more rigidity and resistance to deflection than any other type support. Design also greatly simplifies changing of arbors and cutters.



Twin Screw Knee Support — Exclusive double-support arrangement most effectively distributes weight of new machines' much wider, heavier knee, saddle and table. Balanced design increases stability under heaviest loads . . . offers greater resistance to torsional thrust under all cuts.

Massive Column — Solid back, double-box section column is scientifically ribbed throughout to rigidly withstand heaviest cutting forces. Full bearing column face affords maximum support for the knee. Cross-mounted motor assures maximum ventilation, easy access for routine maintenance.

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Please send me Catalog No. TF-50 with details on new line of TF Series Plain, Universal and Vertical milling machines.

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Why buy Amerstrip? Simply this: it brings you a finish tailored to your needs. High quality Amerstrip will minimize reject problems and improve the finished product. These are the best reasons, but not the only ones, for choosing Amerstrip cold rolled strip steel.

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UNITED STATES STEEL

More Aluminum Foil

Alcoa orders three additional mills to help meet 200 million pound annual demand

ALUMINUM foil is being consumed in unprecedented amounts for numerous household, packaging and industrial applications. To keep ahead of the demand, Aluminum Co. of America announced its third aluminum foil mill expansion within a year. Three additional 72-in. wide foil mills will be installed at its Alcoa (Tenn.) Works.

The mill expansion, with others completed or started within the past year, will more than double Alcoa's foil producing capacity. Foil mill installations scheduled since early 1955 bring the company's additional investment in this single type of facility to $27 million.

Output Rising — Alcoa stepped up foil output early in 1955 by beginning production on four new 50-in. mills at its Edgewater (N. J.) Works. Last August, 11 more mills were purchased. Of these, eight are being installed at the Davenport (Iowa) Works and three at Alcoa Works. All are approaching the production stage.

The three mills under the latest program should be operating at capacity before the yearend to help meet a domestic foil demand presently in excess of 200 million lb annually and still growing.

Announcement of the expansion coincides with the national debut of Alcoa Wrap, a new household foil product with which the company plans to bid strongly for a major share of this market.

Rockwell Buys Kansas Firm

Rockwell Mfg. Co., Pittsburgh, acquired the Locomotive Finished Materials Co., Atchison, Kans. LFM, with almost 500,000 sq ft of production facilities in Atchison and St. Joseph, Mo., has the largest steel foundry and machining facilities west of the Mississippi river, says W. F. Rockwell Jr., president. It casts, machines and assembles a large volume of equipment for the petroleum industry. It also serves the railroad, machine tool, mining, power and other industries. Plans for additions to the Atchison facilities have been approved and further expansion in the area is under consideration. The new acquisition marks Rockwell's entry into the business of producing such items as special machinery of complex heavy design, rock-crushing machinery, centrifugal pumps, oil field and power plant equipment.

Mathews Conveyer Expands

Mathews Conveyer Co. Ltd., a subsidiary of Mathews Conveyer Co., Ellwood City, Pa., is building a plant and office facilities near Port Hope, Ont. The project will cost about $1 million.

Steel Distributor Building

A. M. Castle & Co., steel distributor, is building a general office and warehouse in Franklin Park, Ill. Cost: More than $4.5 million.

Steel Fabricators Merge

Mullins Mfg. Corp. and American Radiator & Standard Sanitary Corp. have merged. Mullins is now the Youngstown Kitchens Division of American Radiator, with George E. Whitlock serving as division president; H. M. Heckathorn is executive vice president. Mullins is a steel fabricator with plants in Warren, Cincinnati and Salem, O.

Cadmet Doubles Plant Capacity

Cadmet Corp., Detroit, producer of investment castings, has expanded production facilities with its recently completed building addition. A. R. Edens, president, says the work area of 15,000 sq ft and the installation of new production and tooling equipment are expected to increase Cadmet production by about 100 per cent.

Cohen Re-Enters Metal Field

M. Cohen Co., originally established in Huntington, W. Va., in 1907, has re-entered the ferrous and nonferrous metal and steel products business. The firm is in a warehouse building and yard at First street and Third avenue, that city. Principals of the company are Aaron C. Cohen and Nelson A. Cohen.

Reynolds Metals Co.

New Dress for Old Signs

Though jingles on signboards are neat
They fade in the frost and the heat;
So to cut overhead
We are covering, Fred,
All the boards with aluminum sheet

—BURMA-SHAVE—

Welding Firm To Move

American Welding & Mfg. Co., Warren, O., will move equipment used in the manufacture of its building products line into the plant acquired in 1955 from Standard Boiler & Plate Co., Niles, O.

Weirton Orders Ore Bridge

Heyl & Patterson Inc., Pittsburgh, will erect an ore stockyard bridge at Weirton, W. Va., for Weirton Steel Co., a division of National Steel Corp. This 10-ton bridge will join the three other ore bridges in operation at the plant.

Republic Forms Niles Branch

Republic Steel Corp., Cleveland, will consolidate its metal door and frame production facilities at a newly created branch of its Truscon Steel Division in Niles, O. These products have been made at the Berger Division in Canton, O., and at the Truscon Steel Division in Youngstown. Larger hangar doors will continue to be made at Youngstown. Groundwork for the transfer began last June when Republic moved the stamping facili-

These turboprop propeller blades

Model CT634S of the Curtiss-Wright Turbolectric series was the first U. S.-designed and built turboprop propeller to be certificated for commercial use by the Civil Aeronautics Administration. This model and others are already in quantity production for military aircraft.

Turbolectric propellers use extruded hollow steel blades produced by the controlled extrusion process developed by Curtiss-Wright. The extruded blade begins as a single-piece alloy steel billet.

With the development of this propeller and the controlled extrusion process came the need to select the right alloy steel. And here's where teamwork paid off.

Republic metallurgists, working closely with Curtiss-Wright metallurgists and engineers, selected an alloy steel with the following properties that make the extrusion process successful from both a production and cost standpoint: freedom from imperfections, uniform response to heat treatment, workability in all stages, weldability, bendability—hot or cold.

These properties in combination with the extrusion process give:

(1) **IMPROVED STRENGTH-WEIGHT RATIO.** The tough, integral structure of the extruded alloy steel blade provides greater strength and resistance to fatigue with minimum weight.

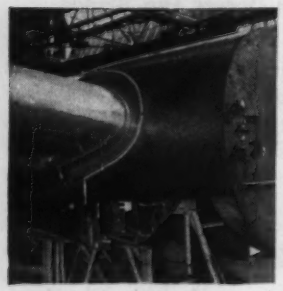
(2) **IMPROVED QUALITY.** Greater uniformity is assured by fabricating from a single homogeneous material.

(3) **INCREASED PRODUCTION.** The number of manufacturing operations is reduced. Production per hour is increased. Floor space is saved.

(4) **REDUCED COST.** Less steel for original stock, less machining, and lower cost tooling and equipment are required. Expensive welding and accompanying preheating and post-heating operations, as well as milling operations, have been reduced.

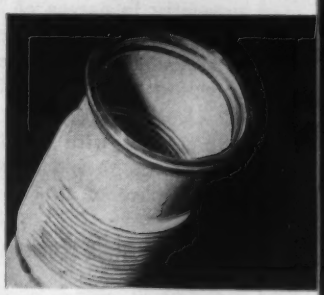
What about your product? Are you using the right steel in the right place? Republic—world's largest producer of alloy and stainless steels—offers you the services of experienced field metallurgists who will work with your staff in determining where these versatile steels can effect the greatest savings. Just send us the coupon.

Strength-to-Weight or Heat Problems—Republic Has the Answers



◀**TITANIUM SAVES WEIGHT ON DC-7** with no sacrifice in strength or safety. Republic is an old hand at this high strength-to-weight business. We pioneered the use of alloy steels, then stainless steels—followed by high strength steels. Now come Republic Titanium and Titanium Alloys. Years of experience gained in helping hundreds of manufacturers design and re-design their products to get more strength with less weight are available to you.

600° F TEMPERATURE HAS LITTLE EFFECT ON DE-ICER DUCTS made of Republic▶ ENDURO Stainless Steel. Because of its extremely high strength-to-weight ratio, and corrosion-resistance you can use ENDURO in thinner, lighter sections. It resists temperature extremes, holding its strength, toughness, and shock-resistance all the way from blistering heat through sub-zero cold. Republic produces ENDURO® in all commercial forms.

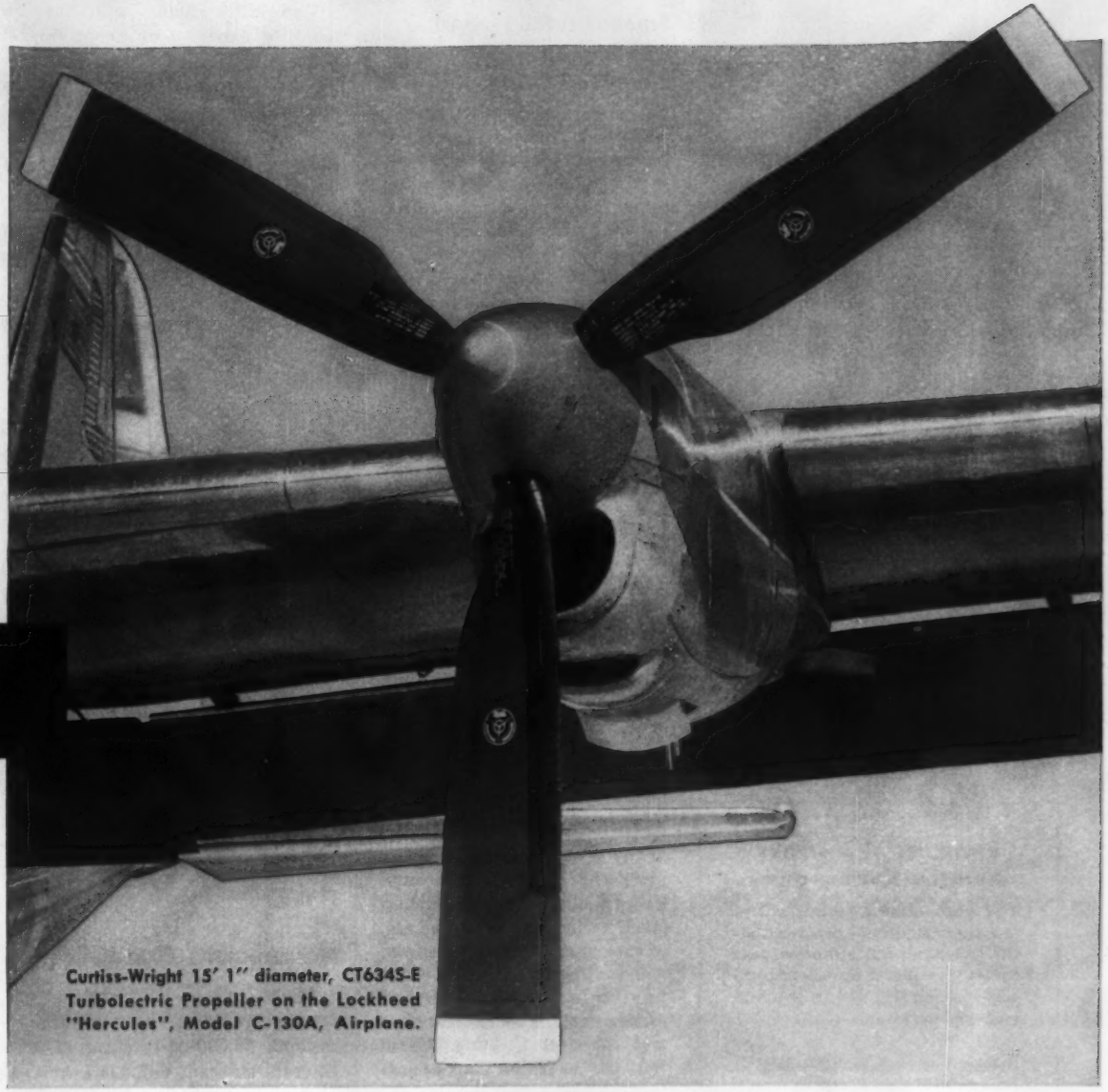


REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

begin as alloy steel billets



Curtiss-Wright 15' 1" diameter, CT634S-E Turbolectric Propeller on the Lockheed "Hercules", Model C-130A, Airplane.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
3120 East 45th Street • Cleveland 27, Ohio

Please send more information on these Republic products:

☐ Alloy Steels ☐ Titanium and Titanium Alloys
☐ ENDURO Stainless Steels

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Abrasive Cutting | *the best way to cut many materials the only way to cut some*

Campbell Cut-Off Machines

Rough, serrated cut of metal saw

Smooth-finished cut of CAMPBELL Abrasive Cut-Off Machine with ALLISON Wheel

Smooth cutting saves grinding operation for American Gear & Mfg Co.

Cross sections of gear teeth—smooth, fine-finished and ready for metallurgical study—save an entire extra grinding operation at the Lemont, Illinois plant of American Gear & Mfg. Co., a division of Brad Foote Gear Company.

These test samples are neatly "sliced" down to a single gear tooth in thickness on a CAMPBELL 406 Oscillating Wet Abrasive Cut-Off Machine, equipped with just the right ALLISON Abrasive Wheel for the job. These sections with fine finish, no hard spots, no change in metallurgical characteristics, come from the WET cut with abundant coolant applied just where it does the most good. It's the OSCILLATION of the abrasive wheel... the right one for the job... that handles big cuts like this with speed and economy.

Examples of Economy Abrasive Cutting gives

• A large aircraft manufacturer reports CAMPBELL Abrasive Cut-Off Machines cut stainless steel tube twice as fast as other methods—saving $32,000 in the first year of operation.

•

International Nickel's tough K Monel, 4¾" dia., is cut in 2 minutes per cut on a CAMPBELL Oscillating Wet Abrasive Cut-Off Machine.

Campbell Engineering Service costs you nothing —can save you much

What is your metal cutting problem? Does it involve cutting of alloy or high carbon steel? Our Field Engineers, abrasive cutting specialists, can help you arrive at that particular combination of CAMPBELL Cut-Off Machine and ALLISON Cutting Wheel that will improve your operation and save you money.

Let us send you this book

ACCO

TRADE MARK

Campbell Machine Division
AMERICAN CHAIN & CABLE

925 Connecticut Avenue, Bridgeport 2, Connecticut

ties of its Pressed Steel Division from Niles to Cleveland, making room for the change-over to doors and frames.

The company plans to utilize the production space created at Canton and Youngstown for other products.

The Niles plant will have a monthly capacity of about 50,000 doors and frames. New bonderizing and spray equipment will be installed.

Pressed Metals, Bantam Merge

Pressed Metals of America Inc., Port Huron, Mich., merged with American Bantam Car Co., Butler, Pa. Bantam's plant will be sold to Armco Steel Corp. Machinery and equipment will be sold at auction.

Enters Plastic Pipe Market

Carpenter Steel Co.'s Alloy Tube Division, Union, N. J., is marketing plastic (polyvinyl chloride) pipe. The product broadens the company's line of tubing and pipe for all types of corrosive service. Plastic pipe sizes range from ½ to 4 in.

Will Process Titanium Ores

Metal & Thermit Corp., New York, will construct a plant in Hanover county, about 5 miles west of Montpelier, Va., for mining and processing titanium-bearing ore. The plant will produce rutile and ilmenite. The project will cost about $750,000.

Massachusetts Firm Builds

High Voltage Engineering Co., Cambridge, Mass., is building a $2-million, 88,000-sq-ft plant at Burlington, Mass. It will house a large radiation machine test facility.

Ford Plans Indianapolis Plant

Ford Motor Co., Dearborn, Mich., will build a plant at Indianapolis, subject to securing satisfactory road, sewer and water services. The plant will be operated by the Dearborn General Mfg. Division and is scheduled to be completed in mid-1957. A. R. Wardrop is general manager of

Anaconda power control cable installed on vital automatic equipment at western dam.

The cables that help keep automation automatic

Where you have automation, remote, supervisory or other types of control, failure of just one wire could be costly — in down-time, upset schedules, damaged equipment. That's why so many automatically say Anaconda for control cable.

You too will rest easier knowing *your* cable is made by people with years of experience in producing the most complex of power cables. At Anaconda, quality control procedures are rigidly adhered to, and research works constantly for better performance.

A big family of Anaconda control cables offers you the *right* cable for every job:

1. *Rubber insulation, neoprene-covered, neoprene jacket over-all*
2. *Rubber insulation, braid-covered, neoprene jacket over-all*
3. *Polyethylene insulation, polyvinyl chloride jacket*
4. *PVC insulation, and polyvinyl chloride jacket*
5. *Polyethylene insulation, nylon-covered, polyvinyl chloride jacket over-all*

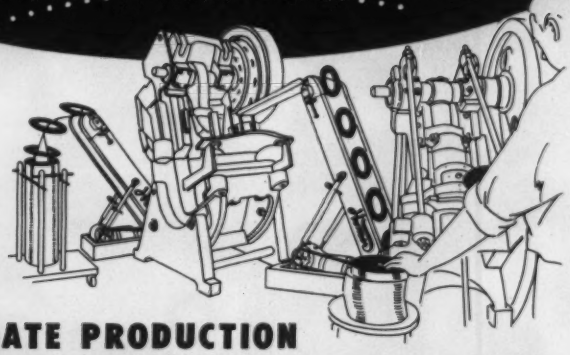
Conductors with printed coding are available — speed work, assure accuracy, and are permanently marked. See the Man from Anaconda or your nearest Anaconda distributor for full information and special application engineering aid. Or write about your cable requirements to: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

55282

SEE THE MAN FROM ANACONDA®

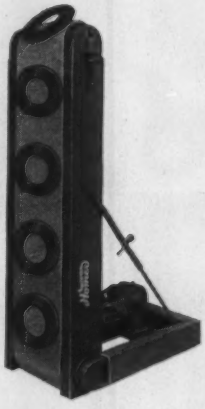
FOR YOUR CONTROL CABLE

HOMER
MAGNETIC CONVEYORS AND
MAGNETIC SHEET SEPARATORS



AUTOMATE PRODUCTION
CUT LABOR COSTS—REDUCE REJECTS
in handling ferrous parts and scrap

Homer "Space Saver" Permanent Magnetic Conveyors cut costs by automatically feeding machines . . . stacking parts . . . transferring parts between machines . . . and performing parts turn-over and other handling operations.



"Space Savers" convey ferrous parts at angles up to 90° without belt cleats, buckets or holding devices. The powerful magnetic assembly securely holds and conveys—ends loss of parts from belt as a result of belt resilience or bouncing over belt cleats—prevents damage to critical finishes caused by parts riding against cleats or jamming in flapper gates.

"Space Saver" Conveyors save floor space because their steeper inclines (up to 90°) without nosed-over delivery . . . and resulting shorter length permit closer grouping of machinery. "Space Savers" have outstanding loading flexibility—any angle, any height above floor . . . from other conveyors, chutes or production machines. Pick up pieces from floor if required. Standard and Custom models available . . . Write for Bulletin MC-250.

HOMER PERMANENT
MAGNETIC SHEET SEPARATORS

Speed handling of steel sheets and pieces. Prevent scratching or marring of surfaces in handling. As each piece is removed, next piece rises clear of stack for easy handling. Write today for Bulletin SS-210.

THE HOMER MANUFACTURING CO., INC.
DEPT. 149 LIMA, OHIO

HOMER FIRST IN INDUSTRIAL PERMANENT MAGNETIC CONVEYORS

the division. The plant's operation will involve production of components and assembly of steering gear units for Ford cars and trucks. A portion of the plant will be devoted to cold-forming operations.

Cleveland Pneumatic Buys Firm

Cleveland Pneumatic Tool Co., Cleveland, purchased National Water Lift Co., Kalamazoo, Mich., manufacturer of aircraft and guided missile control mechanisms. The new property will be operated as a separate division of Cleveland Pneumatic under its present management, headed by C. E. Willis, vice president and general manager.

Plans West Coast Brass Mill

Titan Metal Mfg. Co., Bellefonte, Pa., will build a brass rod mill in Newark, Calif. Production of standard and specialty copper-base alloys is planned. Cost: More than $3 million.

Siegler Buys Electronics Firm

Siegler Corp., Chicago and Long Beach, Calif., manufacturer of space heating equipment and electronic devices, purchased Hufford Electronics Co., West Los Angeles, Calif.

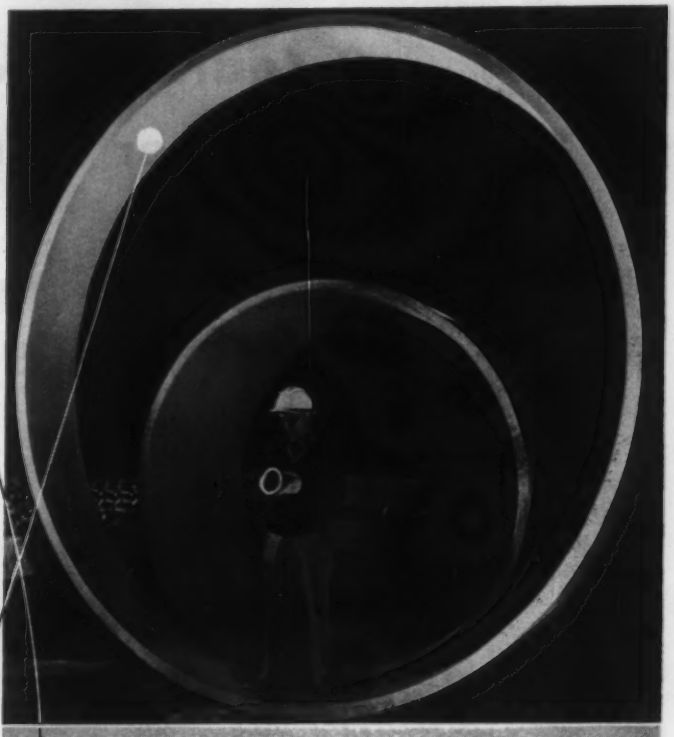
REPRESENTATIVES

Worcester Pressed Steel Co., Worcester, Mass., appointed Wenning Co., that city, as metal stamping sales representative.

Copper & Brass Sales Co., Detroit, has been appointed distributor and representative for continuous-cast bearing bronze and related products of **American Smelting & Refining Co.'s** Perth Amboy plant, Barber, N. J.

These distributors have been authorized to handle the carbide-tipped mining tools manufactured by Carmet, a division of **Allegheny Ludlum Steel Corp.**, Pittsburgh: Carlsbad Supply Co., Carlsbad, N. Mex.; McCombs Supply Co., Jellico, Tenn.; Union Supply Co., Denver;

Machining time reduced by using Edgewater Rolled Steel Rings

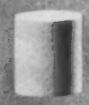


Weldless steel rings of simple or complex cross-sections are readily rolled to close tolerances by Edgewater. The process consists of upset forging of a steel block on a press, followed by the rolling operation, in which powerful mills form shapes such as those shown at the right. Due to the accuracy of the process, a minimum of machining is needed.

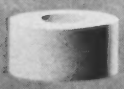
Our engineers will be glad to review your requirements and recommend a shape that will best serve you.

SEND for 12-page bulletin that describes the Edgewater process for making Rolled Steel Rings.

how Edgewater Rolled Steel Rings are made:

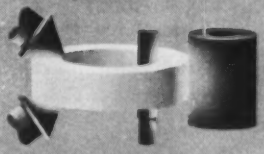


A block of steel is sliced from an ingot or rolled bar. 1

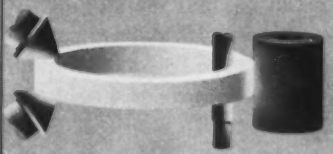


2 After soaking at forging temperature it is upset and punched in a press, forming the "blank."

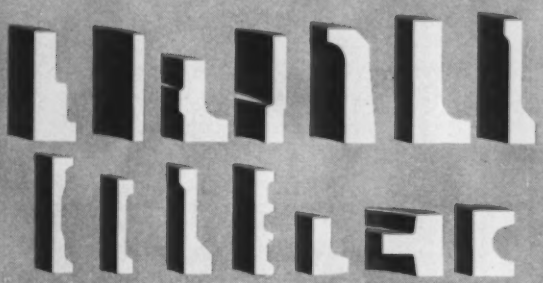
The rolling process enlarges the diameter, reduces the thickness, and forms ribs, flanges, etc., as required. 3



4 The ring is rolled to accurate shape and dimensions, in one continuous process.



typical shapes rolled by Edgewater



Edgewater Steel Company

PITTSBURGH 30, PA.

8 Years of maintenance-free super corrosion resistance!

and *Carpenter* Stainless No. 20Cb is still on the job!

• Pickling tanks made of wood, acid-proof cement and other stainless steels met with little success in coping with the severe corrosion of hot sulphuric acid solution. Then Carpenter Stainless No. 20Cb was given a try.

Now, after eight years of almost constant two-shift use, this special sulphuric acid-resisting alloy still shows no need for maintenance. The tank contains 4 to 8% sulphuric acid solution at temperatures up to 165°F and is used for galvanizing sheet metal products.

If you build or use equipment handling concentrations or solutions of sulphuric acid or other highly corrosive acids, liquids or gases, see why Carpenter Stainless No. 20 and No. 20Cb can help you cut corrosion costs. These super corrosion-resistant alloys are available in tubing, pipe, sheet, plate, bars, strip, wire and billets.

Call your nearest Carpenter Distributor or Branch Office for full information and help.

MEMBER

The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Ask for a copy of the Carpenter Stainless No. 20 and No. 20Cb handbook.

Carpenter

Stainless Tubing & Pipe

Consolidated Supply Co., Picher, Okla.; W. B. Thompson Co., Iron Mountain, Mich.

Automatic Molding Machine Co., Los Angeles, maker of high-speed automatic compression molding machines, appointed West Coast Plastics Distributors Inc., Culver City, Calif., as its representative in Southern California.

Fuller Co., Catasauqua, Pa., appointed Jobe & Co., Baltimore and Richmond, Va., as sales representative for its compressors and vacuum pumps.

ASSOCIATIONS

C. Webb, manager of sales, **Alabama Metal Lath Co. Inc.**, Birmingham, was elected president of the **Metal Lath Manufacturers Association**, Cleveland. E. G. Collins, National Gypsum Co., Buffalo, was elected vice president.

ANNIVERSARIES

Colonial Metals Co. marked its tenth anniversary on Feb. 1 by dedicating an enlarged control laboratory in Columbia, Pa. The company supplies brass, bronze and aluminum ingot to foundries.

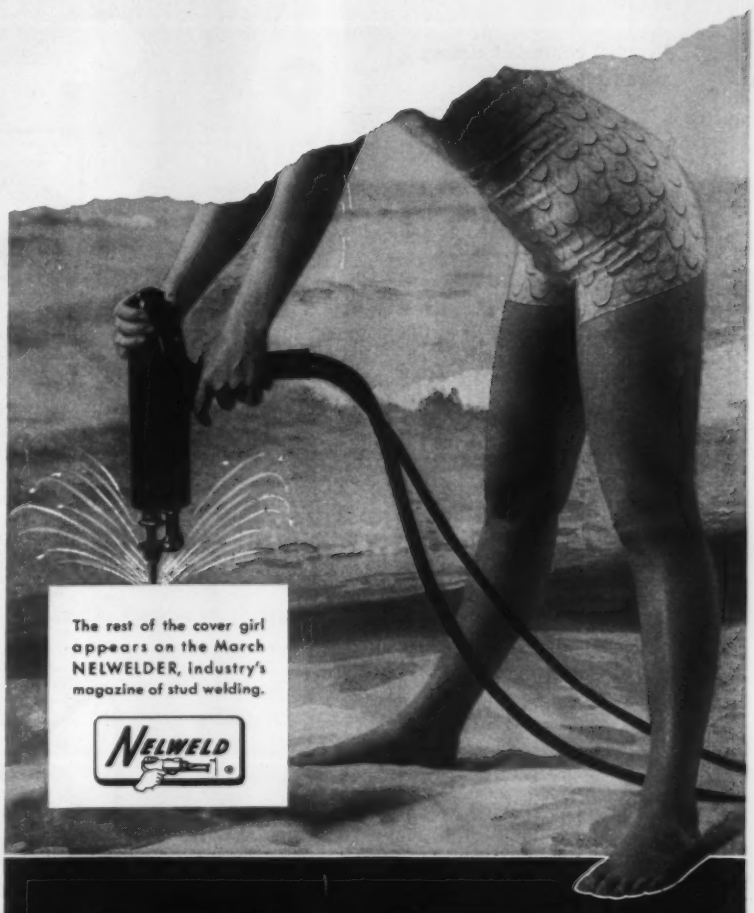
NEW ADDRESSES

U. S. Steel Corp.'s Columbia-Geneva Steel Division moved its northwest district sales offices to the Tower Bldg., Seventh and Olive Way, Seattle 1, Wash. M. H. Freedman is district vice president-sales.

Hydraulic Press Mfg. Co., Mt. Gilead, O., moved its Chicago branch office to 911 Busse Highway, Park Ridge, Ill. Don C. Youngblood is district manager.

Mallory-Sharon Titanium Corp. opened enlarged offices at 1418 N. Highland Ave., Hollywood, Calif. George Denny is district sales manager; Andrew Eshman, district service engineer.

JOT NAME, TITLE AND ADDRESS IN THIS SPACE
TO START YOUR FREE "NELWELDER" SUBSCRIPTION



another way of saying.. **STUD WELDING IMPROVES EXTERIOR DESIGN**

Product designers and architects can smooth out the contours of many a rough exterior by employing the NELWELD® method of fastening. Numerous innovations in stud fastening which eliminate unsightly projections such as bolt heads, and costly bosses and flanges, are published monthly in the NELWELDER. Get in the swim — mail the top of this advertisement to receive your first free issue of the NELWELDER.

NELSON STUD WELDING
Division of Gregory Industries, Inc.
LORAIN, OHIO

hydraulic triple circuit

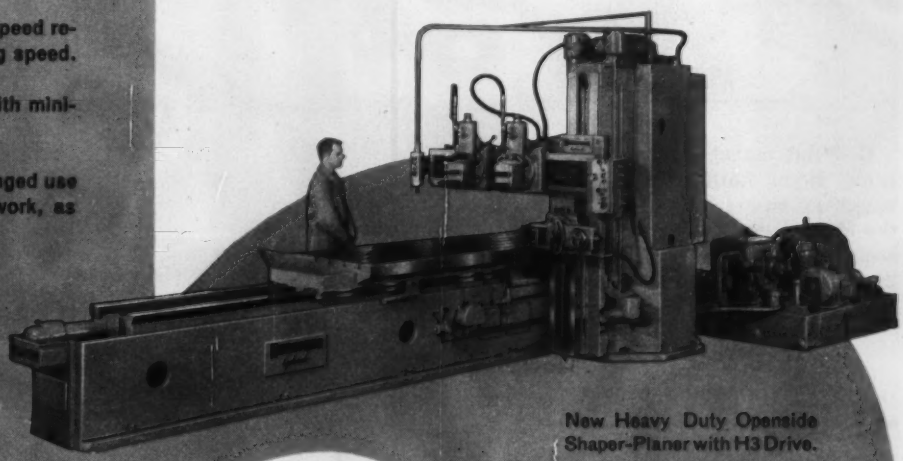
Infinite Speeds from 10 to 300 fpm., stepped through 3 distinct cutting force ranges.

Pendant control of cutting speed selection.

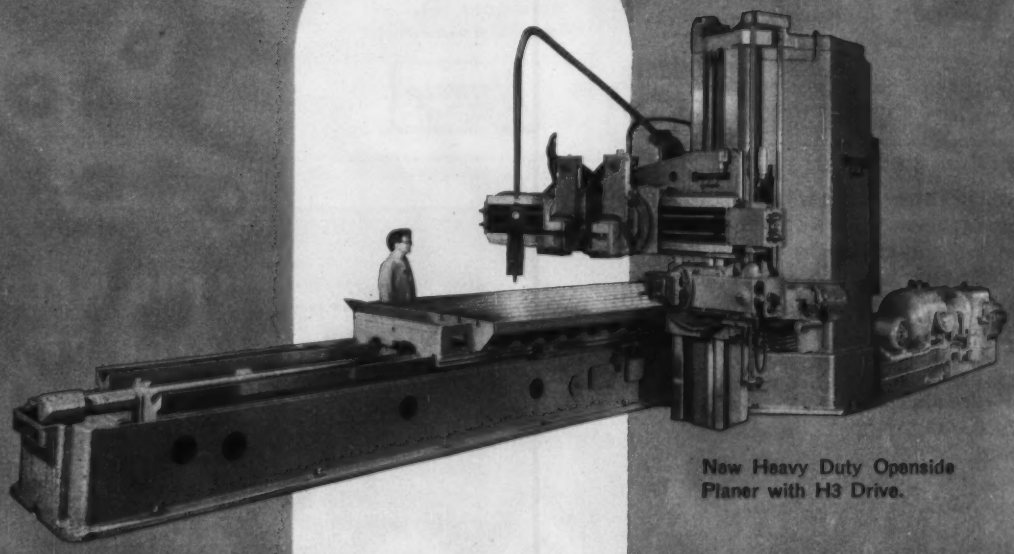
Maximum return speed regardless of cutting speed.

Quick reversals with minimum overtravel.

Suitable for prolonged use on short stroke work, as well as long work.



New Heavy Duty Openside Shaper-Planer with H3 Drive.



New Heavy Duty Openside Planer with H3 Drive.

provides 3 distinct drives in a single machine!

h3 drive

machines free-cutting metals at high cutting speeds
machines average metals at average cutting speeds
machines tough metals with slow, heavy cuts

Hydraulic drive and feed inherently provide efficiency and ease in planing and shaping metal. Now a new dimension has been added to this proved efficiency and economy of hydraulic power. This exclusive new feature on Rockford Hydraulic Planers is called h3 drive—a triple hydraulic circuit to provide the correct combination of cutting speed and required force to most economically machine materials from the free cutting types to the toughest steels.

Many plants, large and small, who are evaluating their present production equipment will find the h3 drive a significant development in their plans for plant modernization.

We invite you to get full details on this new hydraulic achievement from any Rockford Machine Tool Co. representative, or write directly to us.

ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

h3 drive

Sperry

ultrasonic inspection news

40-FOOT ALUMINUM EXTRUSIONS INSPECTED UNDER WATER

How to inspect 40-foot, 1850-lb. aluminum extrusions for internal defects, prior to machining into helicopter blades? – Piasecki Helicopter Corp., Morton, Pa., required an immediate answer to this problem.

The solution was provided by Sperry Products' Commercial Testing Service. At Sperry's Danbury laboratory personnel and equipment were available, including a 100-foot tank which would permit ultrasonic immersion inspection of the huge extrusions.

To best meet your individual inspection requirements, Sperry Products Commercial Testing Service offers you complete ultrasonic testing laboratories in Danbury, Pittsburg and Chicago. Convenient in-your-plant inspection service is also available from these offices, as well as from Sperry Sales Offices in Boston, New York, Philadelphia, Atlanta, Houston and Los Angeles. Sperry Western, Inc., Lafayette, La., offers its specialized experience to the Oil Field Industry.

Actual inspection was accomplished with a Sperry UW Reflectoscope and a PH Positioner equipped to hold the search head at a constant distance from the section. These instruments were mounted on an electric car which also carried the operator. Straddling the immersion tank, the unit was capable of testing at speeds ranging from 2 feet to 32 feet per minute. To perform a complete inspection, covering the 31 inch width, including fillets, required a total of 117 longitudinal passes over each extrusion.

sperry products INC.

FIRST IN ULTRASONIC INSPECTION

To keep posted on latest developments in the profitable use of ultrasonic inspection by industry send for your copy of our new Ultrasonic Inspection News Letter.

Sperry Products, Inc.
602 Shelter Rock Road
Danbury, Connecticut

- ☐ Send me Commercial Testing Service information.
- ☐ Send me the Ultrasonic News Letter.
- ☐ Send me Reflectoscope information.

Name _____

Title _____

Company _____

Address _____

City _____ *Zone* ___ *State* _____

STEEL
February 27, 1956

Technical Outlook

VACUUM TOOL STEELS—Allegheny Ludlum Steel Corp. is pushing its development of consumable electrode vacuum melted tool steels. M. M. Fenner Jr., director of tool and die steels says: "They will be used for high temperature bearings in jet aircraft, for rolls needing a high finish and in other uses requiring extreme homogeneity and cleanliness." Etched discs made by the process will be shown at the company's booth at the tool engineers' show (Mar. 19-23, Chicago).

TURBINE PAYOFF—Small gas turbines are moving toward the helicopter field. Here are some of their advantages over equivalent piston engines: 1. Maximum endurance aloft is 50 per cent longer. 2. There is a twofold increase in ton-mile capacity of payload carried. 3. Many types of fuel may be used. (Comparisons are based on GE's T58, which is in an advanced stage of development. It's in the 1000-hp class.)

CHEAP SUBSTITUTE—If you can't afford a radial drill press, try this: Attach the column of a regular, bench-type drill press to an overhead carriage made from I-beams and conveyor wheels. The overhead carriage can be made to any dimension. It moves the drill press around just like an overhead crane, except that it's rigid. Use drill templates for accuracy.

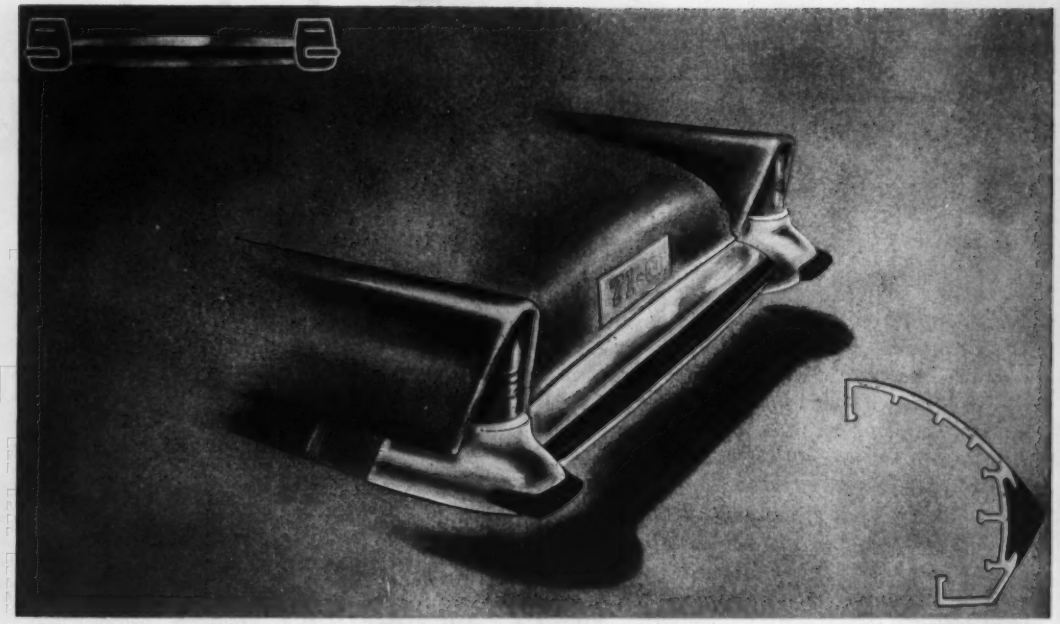
SIMPLE REACTOR—The AEC has asked the Argonne National Laboratory to develop a nuclear reactor in the several hundred kilowatt range. The military wants it to produce electricity and for space heating. Emphasis is to be on simplicity, reliability, transportability and long operating periods without maintenance and with minimum operating personnel. Argonne scientists say the reactor will consist of a pressure vessel containing enriched uranium fuel elements and neutron-absorbing control rods—both submerged in water. The water will circulate through the reactor core by natural convection. Steam produced by heat from fission of uranium atoms will go directly to a turbine generator.

MICROMATION—Miniature ball bearings are automatically assembled on an electronic machine that selects inner and outer races at random. The machine measures the difference between the two races, then chooses balls of the right size. It completes the job by assembling the balls in place and then inspecting the finished bearing.

BEARING ANALYZER—In 90 seconds, a new x-ray anaylzer gives the composition (within 1 per cent) of lead-tin alloy plate on crankshaft bearings. Developed by North American Philips Co., Mt. Vernon, N. Y., it can be run by an unskilled operator.

COAL PIPELINES—Hydraulic transport of coal slurry in pipelines is past the experimental stage and is entering the construction period. This point was made at the national convention of the AIME in New York last week. A 10-in. pipeline, 100 miles long (Cadiz, O., to Cleveland) will handle 150 tons per hour of fine coal slurry at 50 per cent solids weight and 950 psi station pressure. Velocity will be about 3½ mph. A 5½-mile pipeline is handling 1 million tons of coal per year at Carling, France. It is 15 in. in diameter and fed by five 400 hp centrifugal pumps. At Copper Cliff, Ont., 4 million tons a year are transported by pipeline over 7½ miles.

Metalworking Outlook—p. 63 *Market Outlook—p. 153*



Reynolds Metals Co.

Futuristic aluminum bumper is an extrusion. It's already in the Detroit idea backlog

Anodizing stakes a claim as . . .

Automakers Take to Aluminum Trim

GOLD and sterling on '56 automobiles presage a new era in trim: The use of anodized aluminum.

Auto stylists like the eye appeal of the Golden Cadillac grille and the sterling silver DeSoto grille with the gold "V."

All Cadillac grilles and wheels for '56 are anodized aluminum. Standard grilles have the natural aluminum finish (sterling). Gold is optional. Sabre spoke wheels on the Sedan de Ville can be ordered in gold.

Seven Uses—On the '56 DeSoto, anodized aluminum shows on seven trim parts: 1. The grille. 2. The golden "V" medallion on the grille. 3. Sunburst wheel covers on the pace car and the new Adventurer. 4. The gold inset medallion on the steering-wheel hub. 5. Seat side-shield moldings on hardtops and convertibles. 6. Curved trim plates between the rear lower roof and body beltlines of the two-door hardtop (interior and exterior). 7. Door sill scuff plates.

Oldsmobile uses anodized aluminum for its "world emblem" and to create the color stars in the horn cap of the deluxe steering wheel.

Reports are that Olds is doing a lot of development work with anodized aluminum trim. Its experimental Delta, shown at last year's Motorama, has an anodized aluminum roof. At the 1956 Motorama, Pontiac introduced the Club de Mer which has a gleaming blue body of anodized brushed aluminum.

Others—The center of the Plymouth grille on V-8 models sports a gold aluminum "V" on a sterling, aluminum grid. Packard uses a gold aluminum screen behind its grille.

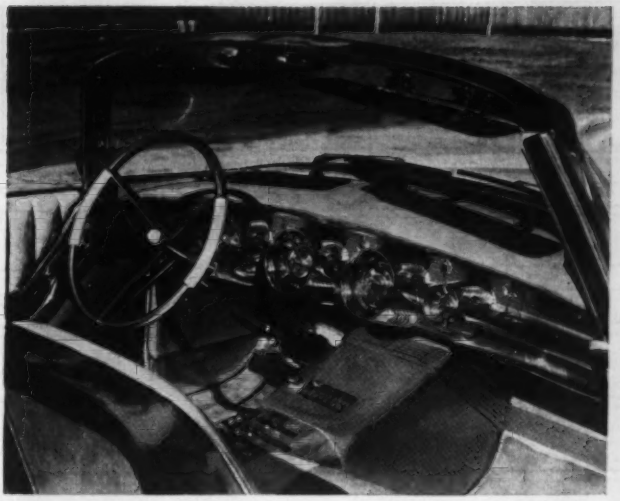
Ford's not using anodized aluminum trim parts in this year's models. But it's rumored that some '57 models will have an aluminum grille.

Most other automakers are preparing to follow suit. Some are calling on production men for two-tone trim effects—a sure sign they have taken to aluminum anodizing.

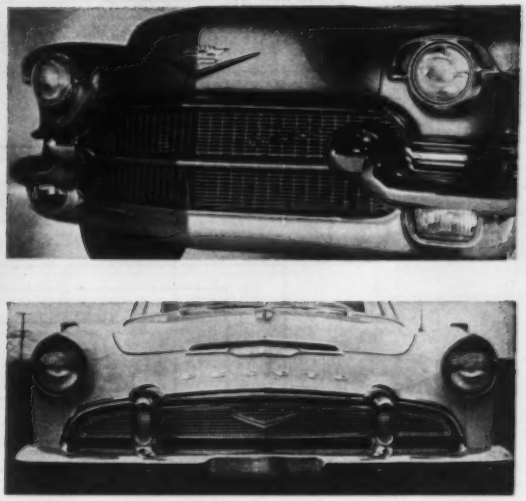
How far will it go? The diagram at top of this page shows an anodized aluminum bumper that Reynolds Metals Co. will try to sell the automakers. A limited-production '57 model may sport a textured aluminum top. It'll be an anodized overlay.

What Is It?—Aluminum has a thin oxide coating on its surface because of its great affinity for oxygen in the air. It's this hard, glass-like coating that protects the metal from corrosion.

This natural oxide film is made



Interiors are big target for anodized trim. This view of the Chrysler Flight Sweep I shows how the material has been worked in to supplement conventional trim. Actual trim is uncolored, the hue is used here to point up aluminum parts and to illustrate color's role in future interiors. For interiors, the color range is almost limitless



These two anodized aluminum grilles are on the road in '56. The Cadillac grille (top) is standard in silver, can be ordered in gold. Cadillac also offers anodized Sabre spoke wheels on the Sedan de Ville. The DeSoto grille and the "V" medallion are two of seven anodized trim parts on this year's models

thicker and more protective by anodizing.

The process differs from electroplating: Parts are connected electrically as the anode rather than the cathode in the bath. In plating, a metal is deposited on the part. In anodizing, oxygen is deposited. It combines with the aluminum to form aluminum oxide, which is integral with the metal's surface.

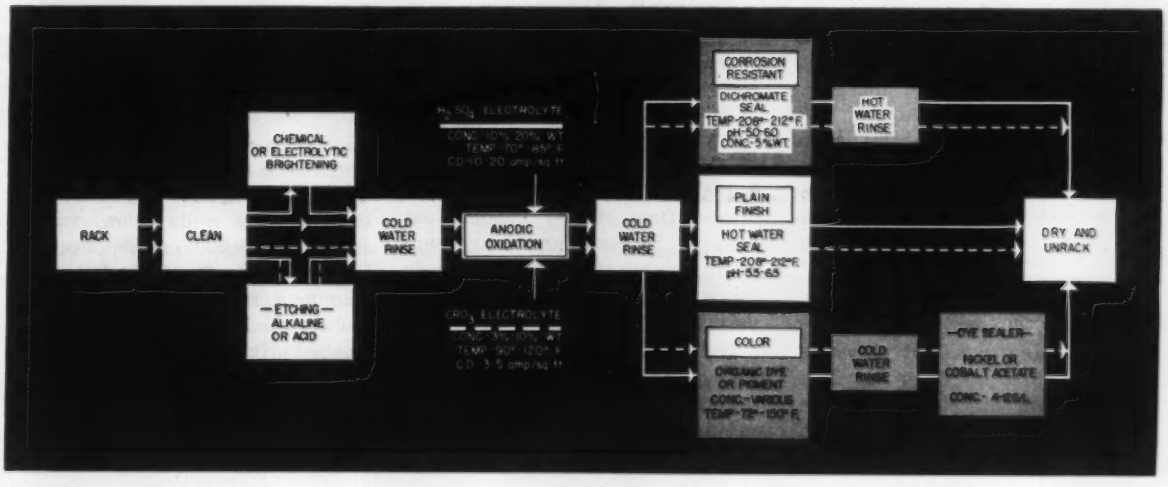
Tailored — Properties of the coating can be varied over a wide range by controlling conditions used to lay it down. Resistance to abrasion increases with coating thickness, and this can be controlled by the anodizing operator to suit the needs of the application.

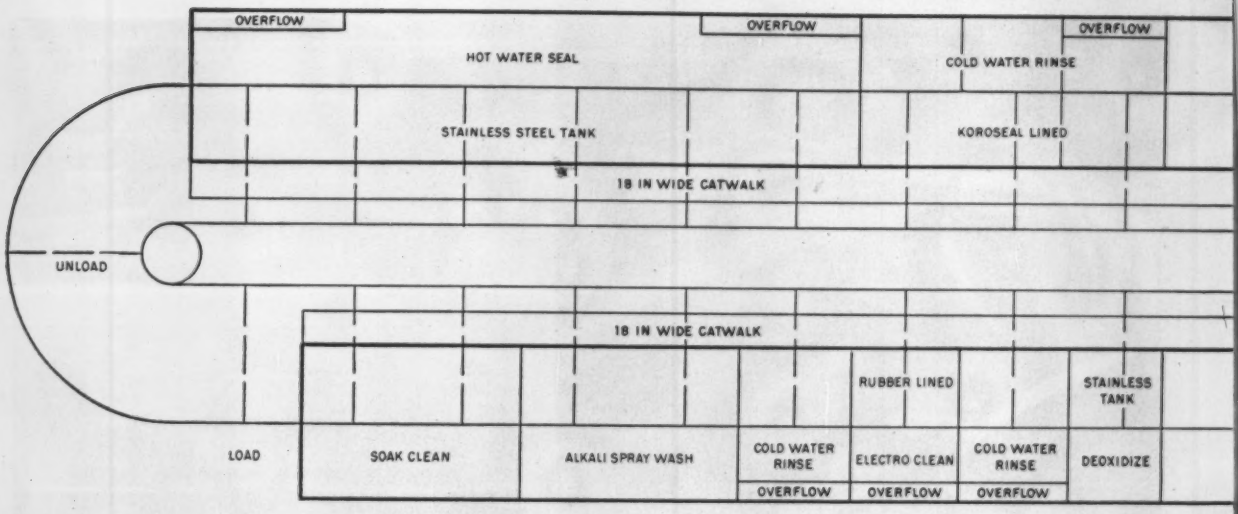
The color of the coating as it comes from the bath depends on the aluminum alloy and the procedure used. It can range from a clear, transparent film to one that is either translucent or opaque.

More Possibilities — The oxide coating reproduces the texture of the surface it covers. This opens up many possibilities, depending on whether the surface is buffed, satin finished or sandblasted before anodizing. And there are combinations of texture: Polished, high-lighted surfaces against sandblasted backgrounds is one combination.

On the smooth, polished sur-

Flow Sheet for Anodizing





Automatic anodizing line at Cadillac takes grille parts through the complete cycle and brings them out a soft silver color. Machine cycle also works for gold color except that final seal tank is drained and filled with a cold water rinse. Parts then are conveyed to another machine (see drawing at right) for dyeing and final seal

Anodizing Aluminum

faces generally used for anodized auto trim the oxide coating has a subdued luster with a pleasing texture. The finish is not meant to come up to the gleam of bright, nickel-chrome plated trim parts. The designer's aim is to sell a so-called mellow luster on aluminum trim which makes a catching contrast when used next to bright plate.

Harley J. Earl, vice president in charge of GM's styling staff, puts it this way: "We do not look for anodized aluminum to replace bright chrome, but believe it will be used increasingly in combination with chrome."

Enter Color—The oxide coating, as formed, is filled with many pores too fine to be seen under an ordinary microscope. Alcoa's scientists have examined them under the electron microscope and say each square foot of oxide surface carries some sixty *trillion* pores with 1000 sq ft of internal pore surface.

This porous structure is a valuable asset. The enormous surface area will take dyes and pigments to give colored coatings that run the gamut of the spectrum. The luster of the metal shining through the color impregnated oxide gives some unique effects.

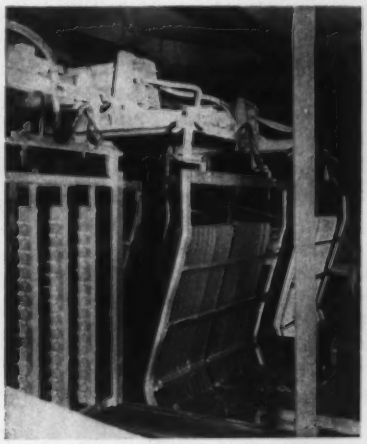
Auto stylists say that the gold and sterling (natural, undyed) exterior trim matches all body colors best. Blues, blacks and browns are available but are described as "not appealing." The finishing of interior parts with a full range of colors is bound to grow.

When color is not wanted, the coating is simply sealed. This closes the pores and makes it resistant to corrosion. When protection is the main objective, corrosion inhibitors, such as chromates, may be adsorbed and sealed within the pores.

Electrolyte—The anodizing bath is usually a solution of a sulphuric or chromic acid. A 10-to-15-per-cent sulphuric acid solution is most often preferred in auto circles for a clear or colored finish. Diagram at bottom of page 111 gives a flow sheet for anodic finishing.

Who Does It? — DeSoto does none of its own anodizing—suppliers and job shops do it. Some do fabricating and anodizing; others do one or the other.

Cadillac wheels are supplied already anodized. The grille is a different story. Assembled of serrated interlocking aluminum strips, each grille contains 57 separate pieces which must be anodized.

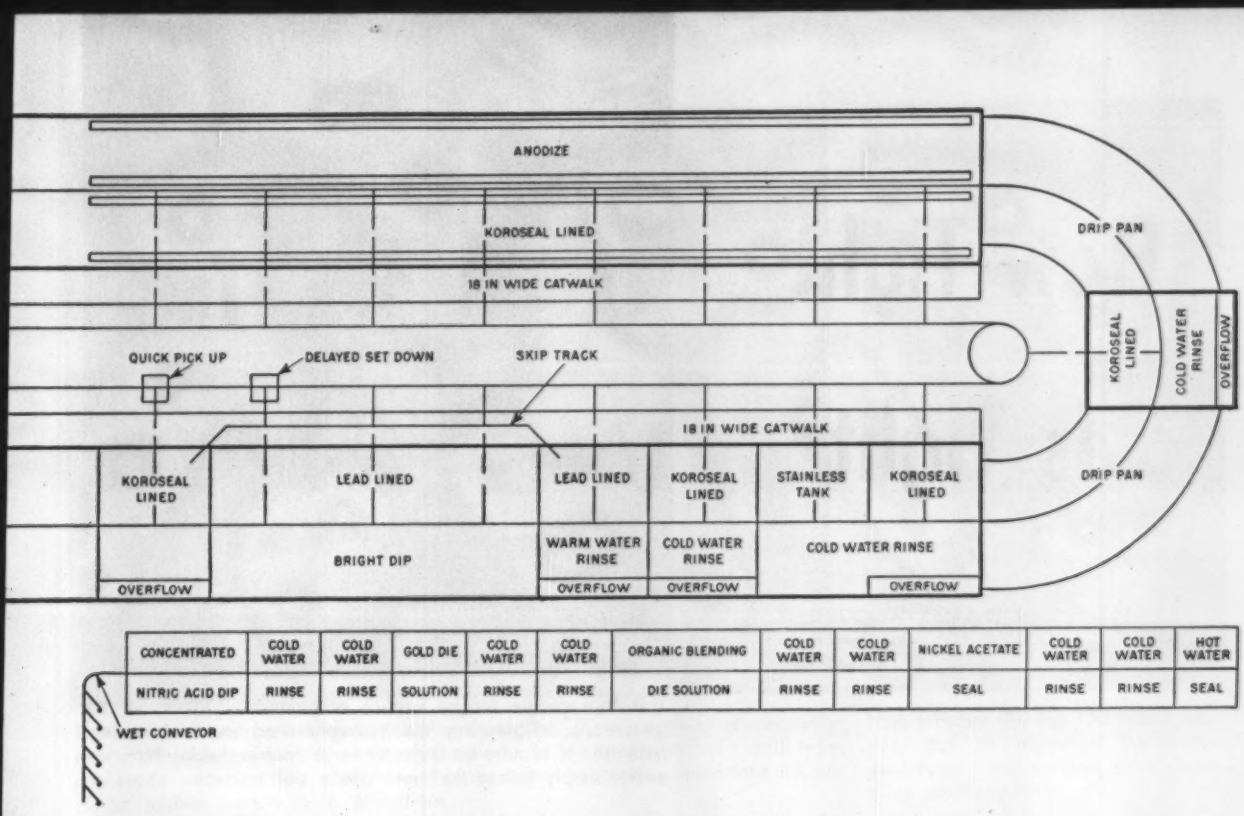


Aluminum grille parts on anodizing racks at halfway point during lift transfer cycle

To keep up with flourishing production, Cadillac anodizes over 50,000 parts a day now, with a target of 70,000 in the offing.

Automatic—It also adds up to the need for what is reported to be auto industry's first fully automatic bright anodizing machine. The job is being done on a Frederic B. Stevens Inc. "Stevadoer" plating and processing machine.

Already in use on paint prep-



aration, rustproofing and copper-nickel-chrome and zinc electroplating jobs, the machine has precise timing control and rapid hydraulic transfer, both essential to consistent anodizing work. The diagram at top of pages 112 and 113 shows the sequence of treatments used in the Cadillac machine for anodizing and coloring.

Controls—A voltage regulator holds the desired voltage with no variation in settings. The selected 12 amp/sq ft of anodizing area is maintained constantly to give a uniform film thickness of specific molecular structure. Other factors Cadillac relies on to produce a quality anodized film: Laboratory controlled electrolyte, automatically refrigerated temperature of the bath and pH-controlled, 205°F hot water for sealing.

Also important for uniform anodic quality is the selection of the aluminum alloy. Purity should be the highest possible within the limitations of material cost and structural characteristics needed with low copper and magnesium content.

First Step—Parts are given a high luster by polishing and buffing. Then they are cleaned to assure uniform anodization.

In cleaning, the surface luster cannot be abused. Cadillac meets this condition with a two-stage cleaning sequence: Immersion in a mineral-base solvent, followed by an alkali spray wash and, finally, an aluminum alkali dip without current.

Bright Dip—After a cold water rinse, the parts enter a deoxidizing solution, and after another cold water rinse, they are immersed in the bright dip solution. A key factor in the automatic bright anodizing process, the bright dip was developed by the aluminum producers specifically for electrochemical surface treatment. In principle, it dissolves the microscopic peaks in the metal surface.

This is followed by a warm water rinse, a cold water rinse and a second deoxidation. Then the parts go into the anodizing bath.

Pores Form—The solvent action of the electrolyte creates pores in the coating which allow the electric current to pass, even though the oxide is a nonconductor. The temperature and concentration of the bath affect the thickness and porosity of the coating, since they influence both the conductivity of the solution and the rate of dissolution of the aluminum oxide. To reproduce colors, these factors must be rigidly controlled.

Natural-finish parts not removed for color remain on the machine. They are given three rinses, and complete the cycle with a hot water (200 to 205° F) seal.

Color Added—Parts to be dyed gold are removed to color tanks (not a part of the machine) after rinsing. (See lower diagram in anodizing layout.) Owing to the delay of 10 minutes in transferring the parts, a nitric acid dip is used to reactivate the film. It is followed by two water rinses.

Parts are dipped in a gold dye solution. A rinse follows, then parts go into a red dye bath. The two colors blend to give the final color. Last steps are sealing in nickel acetate, followed by hot water seal.

Adding about 0.0005-in. to the original part, the anodic coating gives corrosion resistance up to 200 hours in a standard salt solution.

• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

How Tight Is Tight?

By CHARLES W. QUILLEN
Quality Control Department
Ford Motor Co

This four-spindle torque wrench automatically takes out the guesswork. Tightening the spring on an automobile rear axle used to require an inspector for a double check. Now operator simply brings the motors to a stall

HOW DO YOU tighten a nut? Ford wanted to know. It found the answer, but it wasn't a simple one.

Power tools weren't giving us foolproof results. Living up to specifications required inspectors with hand torque wrenches at all critical operations. The task of eliminating the cost of the man with the wrench fell upon the quality control department.

Here's what we found out.

Tightness—Why the fuss over a nut and bolt?

To fasten two or more parts together the best way, a bolt and nut must be tightened exactly. If it's too loose and the parts move, the bolt will fail from fatigue. If it's too tight and the bolt is weakened by being stretched beyond its elastic limit, it has failed already —in a sense. When the bolt is tightened just enough, stress from one part of an assembly can be transmitted through the bolt to another part without weakening the bolt itself.

How well a bolt is stressed (tightened by the nut) is measured by torque.

Tools—Ford uses a variety of power and hand tools to tighten more than 25 million wheel nuts and 30 million body bolts each year --to name only two examples out of hundreds. Hand torque control tools are accurate but slow; labor costs are high. Power types cost more but save time and labor.

Power wrenches come in three styles—impact, clutch and stall. Impact and clutch wrenches are run by either electricity or air; stall types by air alone.

An impact wrench delivers wallop to a nut as long as the operator presses the trigger. Its horsepower is fixed. So torque (up to the maximum setting) depends on how long the operator decides to run the tool.

The adjustable clutch wrench

The Case for Statistics

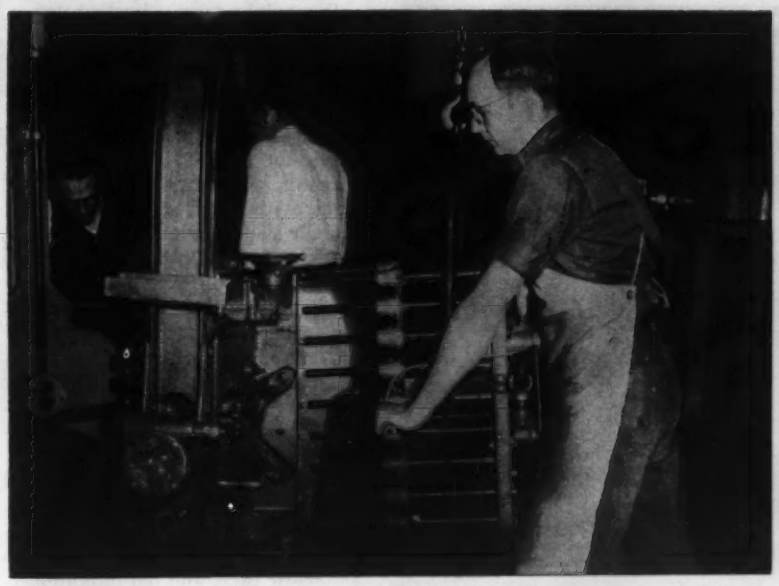
STATISTICS is simply a mathematical way of collecting facts to make scientific statements about them. Select an operation. Collect and measure the facts. Mark the results on a chart, connecting them with straight lines. The result is called a graph. Using the graph as a guide, a trained observer can tell a great deal about what's going on in the operation.

FORD used statistics to solve the torque problem discussed in the accompanying article. The operation Mr. Quillen chose was the tightening of wheel nuts and body bolts. Over the span of several weeks, he collected several charts.

Take wheel nuts. Here's what the impact wrench chart looks like . . .

Of course, the upper and lower control limits and the average have been added. In this case (impact wrenches), the torque readings don't stay within the limits because too much operator judgment is required.

Suppose you tighten the same nuts with a clutch-type tool. Here's Ford's chart for that operation . . .



Tightening oil pan bolts with a multiple nut runner. Once a worry of assembly plants, oil leaks are greatly reduced, thanks to better torque-control. Stall-type pneumatic wrenches like these can be used for tightening operations in an almost endless variety of combinations

High torques, like this 150 ft-lb operation, can be absorbed by proper mountings. The vertical lever shown takes all the punishment

also is a fixed horsepower tool. Compared with an impact wrench, somewhat better control is possible because torque depends on the clutch spring tension—the tighter the spring, the more torque. Two things counteract control in this tool: Wear (which can be adjusted) and operator adjustments.

Since the operator must absorb the torque reaction (considerable at higher levels), he tends to set the clutch lower than specification. Proper torque results from letting the clutch slip in and out through several cycles. Torque control again depends on operator judgment.

Solution—A stall-type pneumatic tool, unlike the first two, is not a fixed horsepower tool. Horsepower is determined by air pressure—the higher the pressure, the more horsepower. Control the air pressure, and you control torque. All the operator needs to do is check the air pressure and bring the tool to a complete stall.

Two or more stall-type tools can be grouped into a multiple spindle tool. This setup completely eliminates torque reaction because one spindle offsets the other.

Ford has done this successfully with wheel nuts and steering column bolts. A five-spindle tool tightens five wheel nuts simultaneously; a three-spindle tool tightens the steering column to the frame.

Today at Ford, all critical tightening operations are controlled automatically. Except for double checking, there are no hand operations.

Maintenance—If you adopt pneumatic stall-type tools, remember that in addition to a good pressure regulator each tool must have a filter and a lubricator. The tools are like an automobile engine: Each must be lubricated.

Don't forget that all air lines have dirt, water and impurities that can ruin a good motor.

This is what analysts call the "classical wear pattern." The bottom reading shows where the operator sets the tool (too tight). As it wears, the readings become lower and lower until they are beyond the opposite limit (too loose). Again, too much operator judgment spells failure for a critical operation.

When Ford decided to adopt stall-type pneumatic tools on all critical tightening operations, the deciding factor was this chart:

The range (difference between the highest and lowest reading in each sample of five nuts) has been added to the bottom of this chart. Note that all points are well within the control limits.

Statistical methods cut the amount of time required to collect and sort the facts. Most important, the statistical approach convinced everyone, including engineering.

An entirely unexpected windfall came from this investigation. Like many limits and tolerances, torque limits were determined partly by formula and partly by rule of thumb. With these scientific data on hand, the engineering staff was able to make additional studies on tooling, specify better, easier-to-maintain limits. The lessons learned are being applied throughout the Ford empire.

Jet engine honeycomb developed at General Electric's . . .

Superlab for Supersonic Power

THAT'S no wastebasket above. It's the core of the jet engine component resting below it. Engineers at GE's Aircraft Gas Turbine Division, Evendale, O., say the honeycomb construction is proving successful for turbine and compressor casings, tailpipes and reheat nozzles.

It's a good insulator, can take temperatures to 1900° F and makes structural members 80 per cent lighter than solid ones. But the honeycomb was dwarfed in magnitude, if not importance, by other things GE revealed recently about the $100-million Evendale facility dedicated to "supersonic power for tomorrow."

Clipped Wings—An impressive aid to research is an IBM 704 computer, housed in a building devoted solely to calculation and data processing. The computer can "fly" an engine still in the design stage. It uses an 8192 word memory and can make 10,000 arithmetical operations a second. Even this capacity is not enough to handle the fantastic calculations. A second calculator of the same type will be working with the first by June.

Research and test equipment includes a whole family of test chambers and cells. They are capable of simulating flight conditions at pressures from 300 psi to 1/20th of an atmosphere, at gas exhaust temperatures to 5000° F and inlet temperatures down to −100° F.

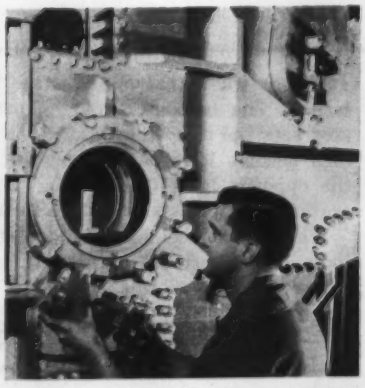
Blueprints were unrolled for a $20-million test facility to be completed by 1958. It will be able to simulate conditions a jet engine would encounter flying 2300 mph at 60,000 ft with air entering the engine at 900° F. In the talking stage is an addition where conditions of flameout and restarting in the air can be simulated.

Small Scale—In the midst of big facilities and big plans, little things came close to stealing the show. One was an advanced testing method. Combined with a new system of data interpretation, it already has saved $2 million and has speeded development of GE's J79 jet engine by many months.

Minute strain, temperature and vibration gages are fastened directly to jet turbine blades undergoing test. Data are picked up on magnetic tape, and fed into an electronic data reduction system. The method means sure information while the engine is running instead of guesswork after it has failed.

And Plastics—Successful use of plastic compressor blades in a conventional jet engine was another surprise. The blades (a reinforced phenolic resin) showed good erosion resistance and the ability to operate continuously between 450° and 500° F. Their strain characteristics are excellent.

If a plastic can be developed to get over the 500° F ceiling, GE thinks plastic blades can be used in advanced engines. The experimental blades weigh about 6 lb less per compressor stage than conventional steel ones, and can be manufactured for one-fourth the cost. Best yet, they use no critical materials.



Simulated air speed can reach 1800 mph in this wind tunnel

Standard Equipment for McKee Engineers

The packed bag is not just a figure of speech at McKee. Our engineers are off at the drop of a hat for Calcutta or Caracas—or any other place in the world where iron and steel are made or where oil or chemicals are processed—wherever industry builds.

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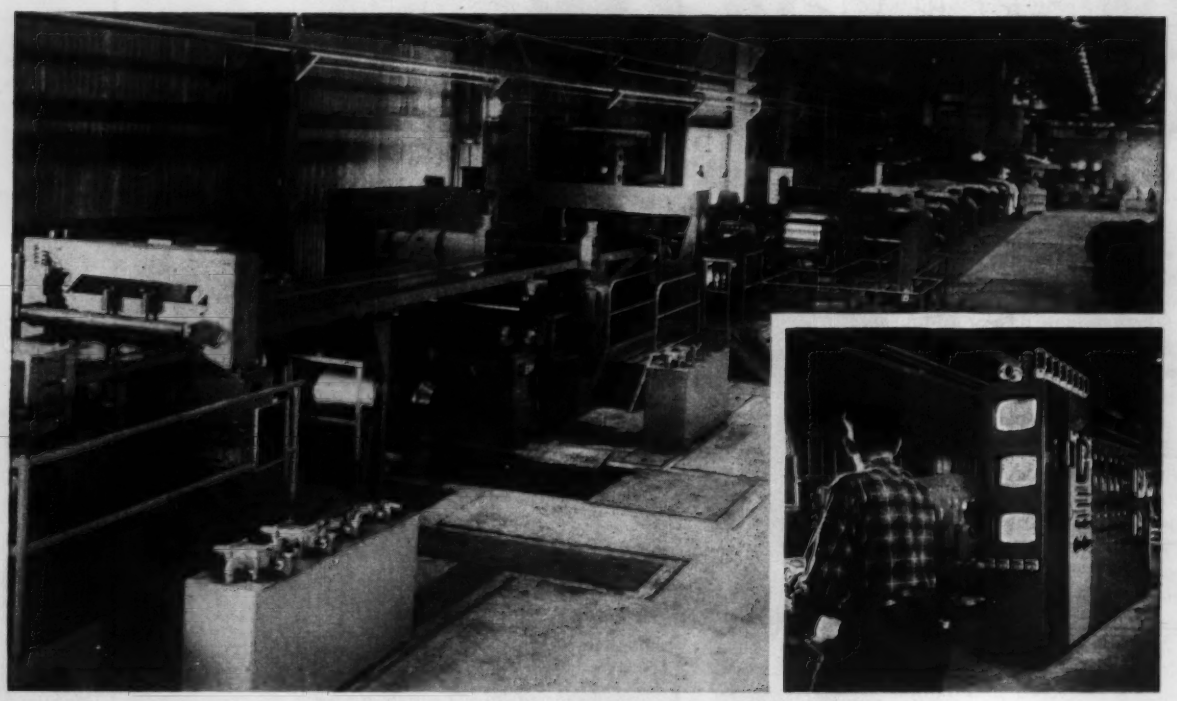


Television plays a new role on this line. From his pulpit, the operator can see the prime sheet piler, scrap baller and entry uncoilers

More Galvanizing for Canadian Markets

Continuous line at Stelco is a galvanizer's dream. Top speed is 300 fpm, and tight, ductile coating can be guaranteed for any type of steel

CANADA is another step closer to being self-sufficient in galvanized steel. A 48-in. continuous line at the Hamilton, Ont., works of Steel Co. of Canada Ltd. is now turning out 10,000 to 12,000 tons of coil or sheet every month.

Installed under license from Wheeling Steel Corp., this line incorporates all of the operating features of the original Wheeling lines (STEEL, April 5, 1954, page 100) which have a maximum width of only 36 in. The additional width in the new line, coupled with other features, gives it perhaps the highest production rate per manhour of any line in the industry.

TV Useful—A novel feature for a galvanizing line, and one which keeps the line operating at peak efficiency, is the three-station television setup. From his control pulpit roughly at the midpoint in the line, the operator can view the main prime sheet piler, the scrap baller entry and either of the entry uncoilers.

Stelco officials point to the baller application as one place where the TV really pays off. Control of the baller drive is tied in with the line. Side trim scrap travels down a ramp to a threading bobbin which distributes it along the length of the baller mandrel. With a TV camera directed constantly on this operation, attendance at the scrap baller is required only when discharging a completed ball and rethreading the scrap ribbons into the mandrel.

Quality and Flexibility — These are the two plus features of a Wheeling-type line. Quality, of course, is measured in terms of adherence of the zinc to the steel. Thanks to a small quantity of aluminum, kept intimately mixed in the molten zinc by the thermal stirring action of the induction heating coils, formation of a brittle iron-zinc alloy between base metal and coating is greatly minimized.

Flexibility stems from the fact that coils for the line can be deoxidized-annealed to any condition before they are brought to the line. Any type of steel base can be introduced into the line, covering any range of hardness or ductility. Since the tightness of coating is controlled solely by conditions in the zinc bath, it is now possible to produce guaranteed tight coatings on an extremely wide range of specifications.

Operating Highlights—An ultramodern tractor type carrier brings

HOT STRIP MILLS

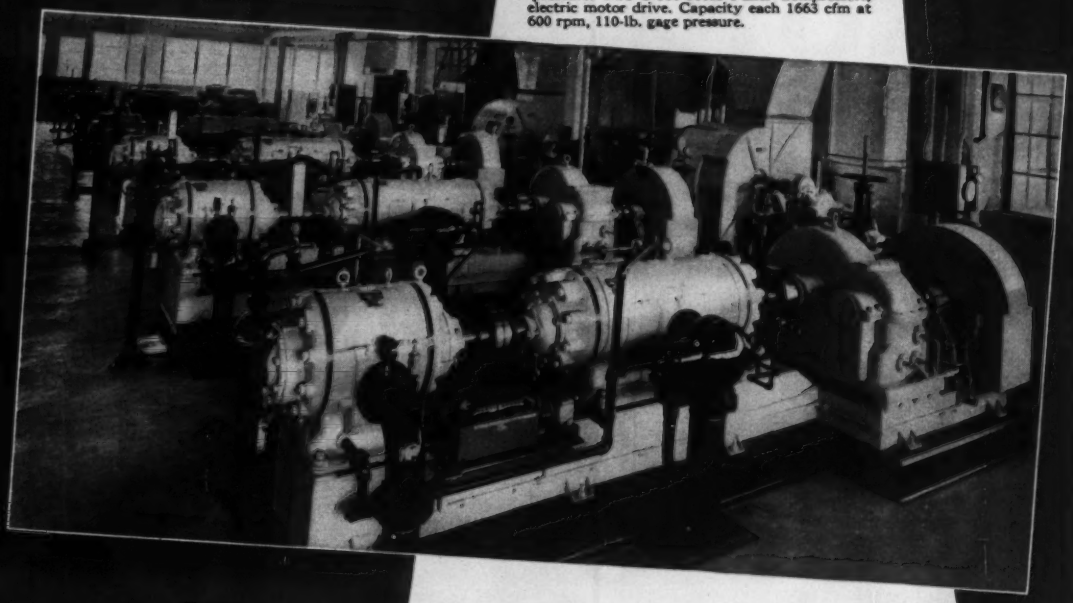
Designed and Built by MESTA

Mesta 80" Four-High Continuous Hot Strip Mill—Finishing Stands Installed at the Fairless Works, U. S. Steel Corporation

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA



Four C-300-300H Fuller Compressors, steam turbine drive. Capacity each 1248 to 1805 cfm with a corresponding speed range of 450 to 650 rpm; one 125 and three 110-lb. gage pressure. Two C-300-300H Fuller Compressors, electric motor drive. Capacity each 1663 cfm at 600 rpm, 110-lb. gage pressure.

PUTTING THE AIR IN AIRCRAFT

Aircraft companies use a lot of compressed air in the manufacture of airframes, engines, systems and components. The battery of six Fuller compressors pictured above meets one important aircraft facility's entire diversity of compressed air needs, efficiently and economically.

The key to Fuller's smoother operation is *rotary motion*, which provides large capacity in relation to size, simple direct drive from motor or internal combustion engine, minimum number of working parts, one-way air flow free from pulsation, lack of vibration, continuous service with minimum supervision and maintenance. Operation in cramped quarters or on ordinary flooring is simple and practicable.

Fuller Rotary Compressors are built for capacities to 3300 c.f.m., 125-lb. pressure. Write for Bulletin C-5A, illustrating and describing these machines.

Fuller

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C-274
1776

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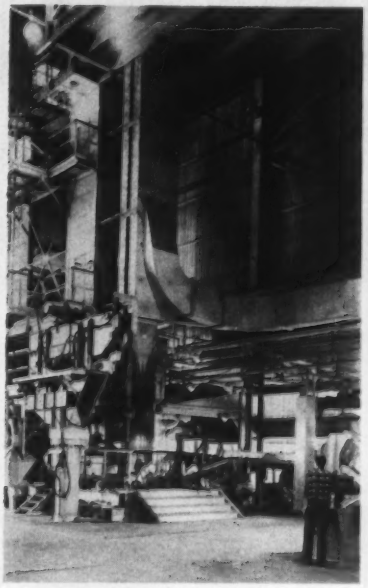
the coils to the galvanizing line. This machine tucks four coils under its frame and completely encloses them so that the weather conditions cannot possibly affect the metal in transit. Electric eyes automatically open mill doors as the carrier approaches.

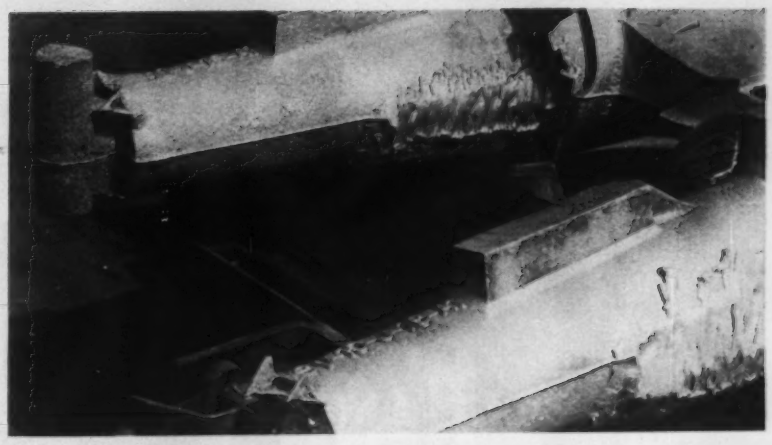
At the entry end of the line, coil ends are welded together. The first section is a series of light cleaning operations in acids, alkalis, scrubbers and water sprays. Moving on to the coating stage, the steel is dipped into flux, run through a drying furnace and then goes down into the zinc pot.

In this induction-heated ceramic pot some 160 tons of zinc and whatever aluminum has been calculated necessary for a tight coating are kept at 850°F. Coated strip then passes through a cooling section and, at room temperature, enters a chemical treating section that improves the coating's corrosion resistance. Following washing and drying, strip is level-rolled and then either coiled or cut into sheets of any size from 3 to 14 ft long.

Wean Engineering Co., Warren, O., was the prime contractor for this line as they were for the original Wheeling lines.



Heart of the line is the 160-ton zinc pot. Galvanized strip can be seen moving into the cooling section. Zinc metal is automatically added to the pot by the conveyor in the background, right



Smooth finish and sharp letters on the shaft end cast in zircon sand contrast with those cast in silica sand

Zircon Sands Line the Mold

ZIRCON SANDS in the molds have improved steel castings at National Supply Co., Torrance, Calif.

Castings are smoother and have no "burnt-on" sand or core penetration. Although the material costs five times more than silica sand, the cost of removing "burnt-on" sand or removing a core with severe penetration makes it worth the premium, National Supply feels.

Used Sparingly — Cost is minimized by using it sparingly. In making a large core, the face is lined with zircon sand (about 1 in. thick) and backed up with silica sand. This thickness has been found to be as effective as greater ones. Another factor in limiting the use of the sand is its low permeability, which makes the release of gas from the mold difficult if used over large areas.

Characteristics of value to users of castings and the foundry include: 1. A conductivity twice that of silica sand. 2. A melting point of 4000°F, or 3400°F with binders. 3. One-third the expansion of silica sand. 4. Good chilling properties. 5. Chemical stability. 6. Ease of removal during shakeout. 7. Fineness.

Additives—The formula adopted by National Supply is primarily for high hot strength. Additives include 1 per cent bentonite, 2.5 per cent fire clay, 0.20 per cent cereal and 3 per cent water. Choice of additives is important in getting the beneficial effect of zircon sand.

The method of ramming molds, drying them, the length of time they are closed before pouring and the number of core rods also have important effects upon casting quality.

Another factor in satisfactory use of zircon sand is the wide variation of properties. Screenings show AFS fineness so highly variable that each shipment must be tested to assure it will meet specification. In some instances, too much oil contamination will make green strength variable because the grains will not take the bonding material.

Effects of 3% Bentonite and 3% Fire Clay in Mold Sands

	Zircon Sand	Silica Sand
Moisture	3.9	4.2
Permeability	21	190
Green compression	7.1	4.0
Flowability	88	86.5
Density	179	100
AFS fineness	121	50

the first name in resistance welding

THOMSON

In his lifetime, Elihu Thomson amassed the astounding total of 700 patents, many of which profoundly influenced developments in almost every field of industry.

Perhaps his most notable invention is resistance welding. Basic patents were applied for in 1886 shortly before he founded the Thomson Electric Welder Company.

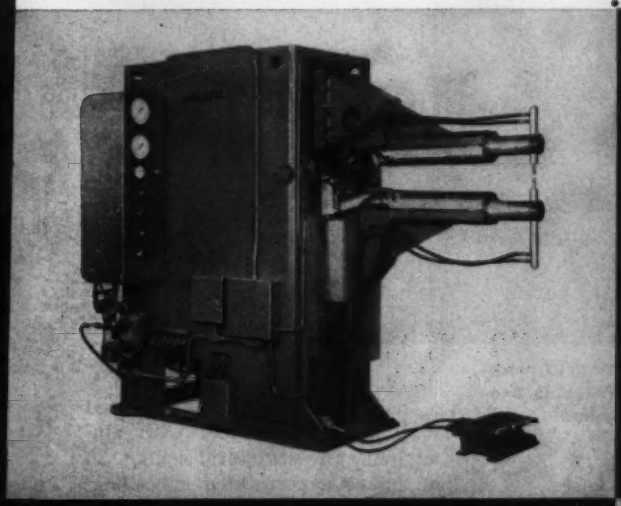
Since then, the Thomson company has continued to pioneer in the development of resistance welding equipment and is largely responsible for making the process the economical and widely applicable production tool it is today. Recent Thomson contributions to the art of resistance welding include:

- Development of high-production standard spot, projection and seam welders.
- "Synchro-Matic" flash welding which opened up entirely new fields of non-ferrous as well as ferrous metal joining.
- Application of automation and precision control to all types of resistance welders.
- Fabric welders, brake shoe welders and other specialized equipment.

Thomson men are strategically located in all metalworking centers. We welcome an opportunity to discuss your resistance welding problems with you.

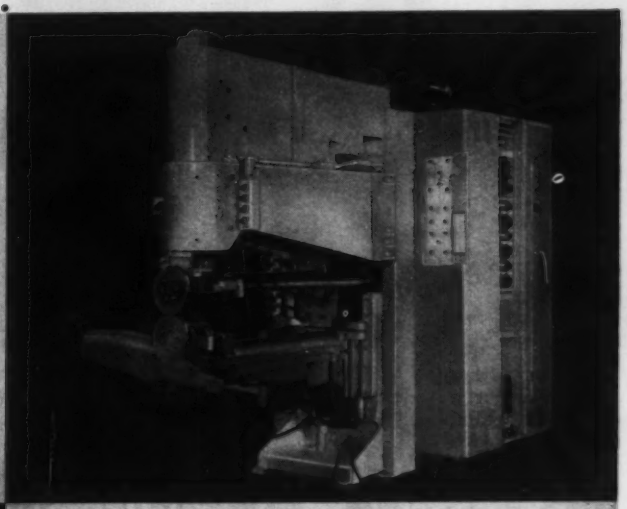
SPOT AND PROJECTION WELDERS

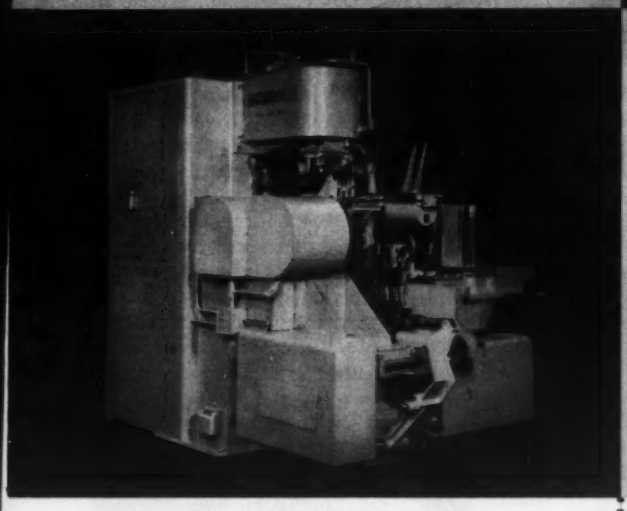
The Thomson line is complete ranging from bench welders to heavy duty presses. The machine shown below is an air operated rocker arm aircraft spot welder.



SEAM WELDERS

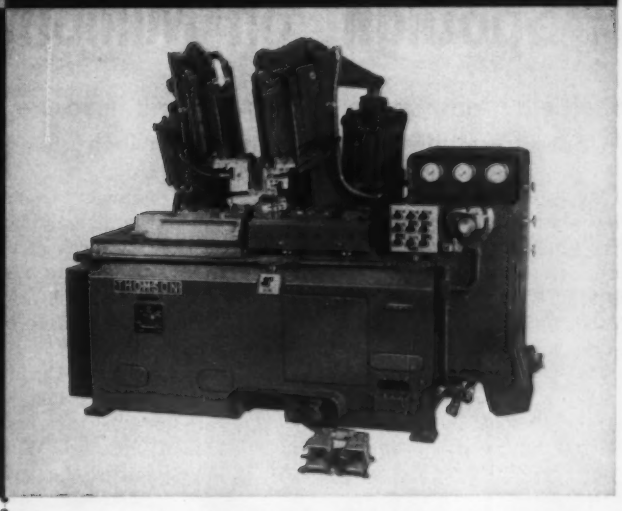
Sizes range from 50 to 400 KVA including models for circular or longitudinal seaming or universal machines such as the model shown which handles both types.





SPECIAL PURPOSE WELDERS

Many Thomson special designs have become standard equipment in their fields of application. This is a Thomson brake shoe welder with automatic web feed.



"SYNCHRO-MATIC" FLASH WELDERS

An exclusive Thomson development for flash-butt welding ferrous or non-ferrous metals. The Model F3 Synchro-Matic shown is tooled for miter welding window frames.

FOUNDED IN 1880 BY ELIHU THOMSON

INVENTOR OF RESISTANCE WELDING

THOMSON *Welders*

THOMSON ELECTRIC WELDER COMPANY, LYNN. MASS.

Small room at the left houses the rare Zeiss-Koesters interferometer that measures with monochromatic light. Temperature of the room is controlled to one-twentieth of a degree fahrenheit. Humidity also is closely controlled

A Spotlight on Millionths

Sheffield's new gage laboratory will measure with light to detect as little as a millionth of an inch

ANY schoolboy knows Eli Whitney was the inventor of the cotton gin. But many industrialists feel the schoolboy isn't being taught the most important point: The father of interchangeable parts made mass production possible.

As a memorial to Whitney's larger contribution, Sheffield Corp., Dayton, O., is inaugurating the Eli Whitney Metrology Lab.

Although the aim is to perpetuate Mr. Whitney's connection with precision, Sheffield executives have coincidentally established a memorial to their avid devotion to the millionth of an inch.

Measuring In Light—Heart of the $250,000 laboratory is a Zeiss-Koesters Absolute Interferometer. It uses light sources of helium, krypton, cadmium or mercury 198.

The interferometer takes arced light from one of these sources, reflects it from two surfaces and then combines the results in a pattern of alternating light and dark bands. From an equation using the distance separating these bands, the distance between the reflecting surfaces can be computed to extreme accuracies, say a millionth of an inch.

One of only four or five in this country, Sheffield's Koesters interferometer was brought in from West Germany last year. A truly rare breed, the instrument was hidden during World War II. Shortly after the end of the War, Louis Polk, Sheffield's president, heard about the instrument and began to track it down. The purchase of the machine in 1955 culminated the long search and tedious negotiations.

Environment—Basic air conditioning and the structural design of the laboratory were built up from scratch. There is no structural contact between the laboratory and the building that houses it. The lab floor is carried on detached, separate footings. The base is an 8-in. layer of concrete covered with a 4-in. layer of insulating cork. This is topped off with a second concrete layer that's surfaced with plastic tile.

The 8-in. walls are insulated with glass wool, faced with aluminum. The structural ceiling, 36 in. above a perforated subceiling, also is insulated with a 4-in. cork slab.

Atmosphere — Custom-built air conditioning keeps the room at 68°F and holds relative humidity to less than 50 per cent to preclude rusting of sensitive instruments and gages.

Detective — Within the laboratory is a smaller room that houses the interferometer and several other instruments. It has a separate temperature indicator that is sensitive enough to soar when a man enters, and accurate enough to control the temperature of the room to within one-twentieth of a degree fahrenheit.

With this temperature control, accurate barometer and humidity instruments keep Sheffield's readings as correct as those at the Bureau of Standards in Washington (to the sixth decimal).

Purpose — In addition to the prestige the lab will bring to Sheffield, it is being made available to industry as a service facility for checking and calibrating gage blocks and other gages and to check hardness, surface finish, circularity, threads, flatness, contour and roundness.

To do the job, the interferometer is supported by comparators, air gages and other appropriate equipment.

A SUNDAY DRIVE ON 32 SPOT WELDS

YES . . . even your automobile wheels are assembled with Sciaky Resistance Welding

Every weekend millions of families just like yours take their Sunday drive in automobiles with spot welded wheels!

Every *day* of the week outstanding manufacturers like Motor Wheel are turning out thousands and thousands of those wheels with Sciaky patented Three-Phase resistance welding . . . faster and at lower cost than ever before!

And as for *quality* — years of exhaustive testing proved eight Sciaky spot welds better than the previous twelve precision rivets.

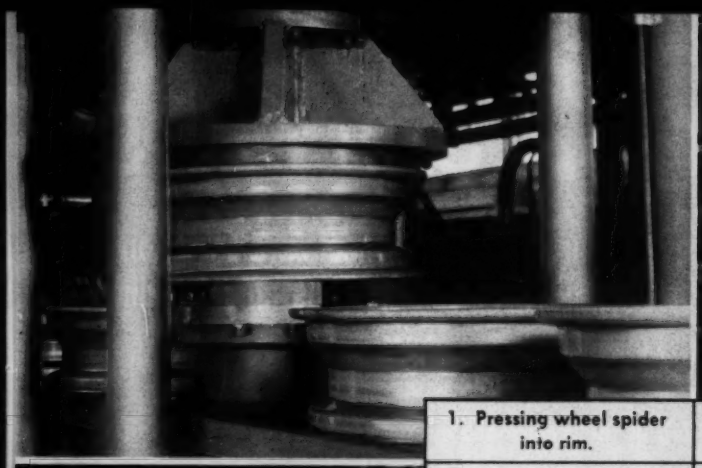
Whether *you* make automobile wheels or not, if you *do* join metals in production . . . if you want it faster and better and at lower cost . . . see about Sciaky resistance welding — just like the wheel people did!

SCIAKY®

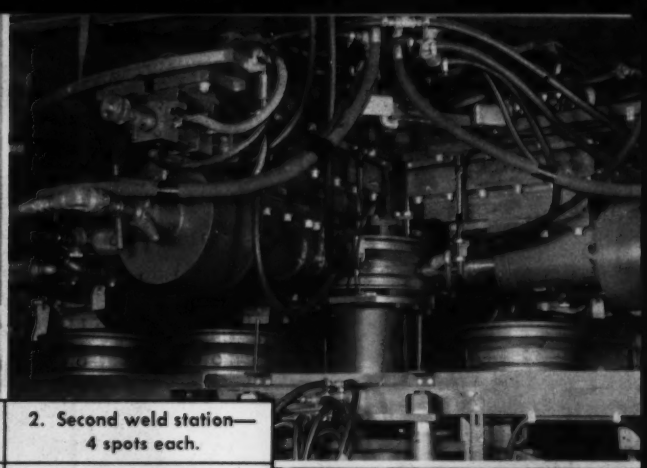
Largest Manufacturers of Resistance Welding Machines in the World

Dick Carlton

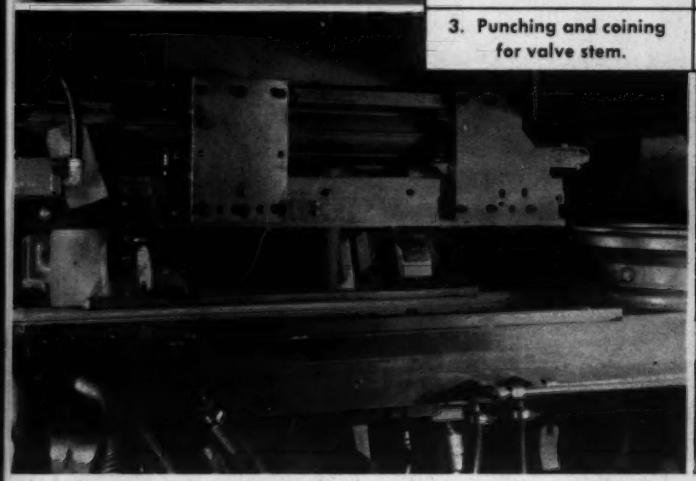
Turn the page for the impressive details of this tremendous improvement in wheel fabrication ▶



1. Pressing wheel spider into rim.



2. Second weld station—4 spots each.



3. Punching and coining for valve stem.

4. Dimpling wheel cover retainer.

Sciaky Resistance Welding Techniques readily satisfy critical primary structures

with weld integrity and consistency in high production

Today Motor Wheel and other leading manufacturers are fabricating critically stressed automobile wheels with eight Sciaky Three-Phase spot welds instead of the previous twelve precision rivets. The elimination of the holes for rivets or other mechanical fastenings satisfies the air-tight requirements for tubeless tires as well.

A true example of automation, fully automatic Sciaky equipment includes press assembly of parts, piercing and coining of valve hole, and dimpling wheel trim retainers. Skilled labor no longer needed is made available for other important operations.

This tremendous advance in design concept and production methods is the result of years of exhaustive testing and development. Only Sciaky patented Three-Phase balanced load welding with 85% power factor (compared to 30% for conventional unbalanced load single phase) provides the integrity and consistency necessary to critical wheel assembly.

Write today for "Resistance Welding At Work," Vol. 4—#9, completely describing this outstanding application—yet another fine example of Sciaky basic thinking . . . resistance welding techniques to do *more useful work* at *lowest operating cost* with *maximum reliability.*

Largest Manufacturers of Resistance Welding Machines in the World

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Sciaky Bros., Inc., 4914 W. 67th Street, Chicago 38, Illinois, POrtsmouth 7-5600

Precision Drilling

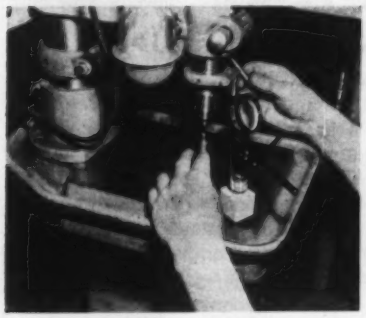
The holes in a thermocouple are 0.010-in. in diameter and are spaced 0.030-in. apart

PRODUCING tiny thermocouple tubes in small ceramic insulating rods posed a tricky problem in methods engineering for Norton Co., Worcester, Mass.

In each ceramic rod are one or two holes running parallel with the axis. Hole diameter is 0.010-in., with the holes spaced 0.030-in. apart. Fine wires are threaded through the holes to obtain electrical and thermal insulation.

Extruded Rods—The insulating rods are produced by extruding an aluminum oxide mix over steel dies. Forming the tubes in the rods called for precision machining of the dies, but because contemplated production of the thermocouple tubes was limited, heavy tooling expenditures were not warranted.

Norton engineers came up with a procedure for locating the holes by precision drilling of the die and inserting piano wire or drill blanks to form the holes during extrusion.



DRILLING DIES
. . . magnifying glass aids operator

Procedure—The dies are drilled at 4100 rpm on a Delta high-speed drill press with the work located in a small jig. A magnifying glass aids the operator in locating the holes. Tolerances are held to 0.0001-in.

After the die is drilled to a depth of ⅛-in., cut-to-size piano wire or drill blank stock is inserted in the holes, and the projecting pins become an integral part of the extrusion die.

PARTS LAST LONGER . . . if they're centrifugally cast by the Shenango process. Tougher parts because of finer, pressure-dense grain, greater strength, better elongation and freedom from sand inclusions and blow holes. There's minimum waste, less machining. The large bronze liner and seat ring shown here are typical of various parts, large and small, ferrous and non-ferrous, regularly produced in Shenango's modern plant. Informative bulletins give all the facts. Write to: Shenango-Penn Mold Company, Centrifugal Castings Division, Dover, Ohio.
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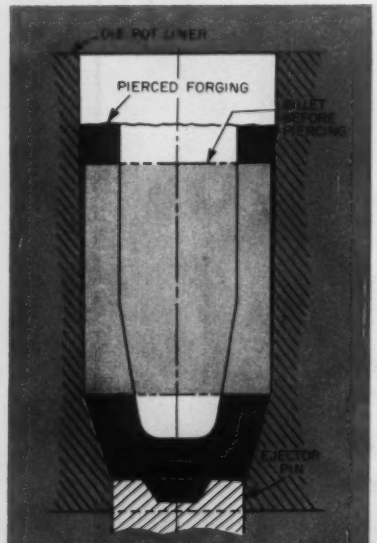
Shell Forming: Some Like It Hot, Some Like It Cold

By DR. ARTHUR F. MacCONOCHIE
Professor of Mechanical Engineering
University of Virginia

How Cold Shell Forming

Cold Forming

1. Saw slug
2. Deburr and buff slug
3. Pickle, Bonderize and lubricate
4. First squeeze to cabbage
5. Same as No. 3
6. First cup (rearward extrusion)
7. Grind out seams
8. Full anneal
9. Same as No. 3
10. Second cup (rearward extrusion)
11. Same as No. 3
12. Third cup (rearward extrusion)
13. Same as No. 3
14. Extend by forward extrusion
15. Same as No. 3
16. Expand bourrelet
17. Nose
18. Stress relieve
19. Same as No. 3
20. Bore nose and chamfer
21. Machine band seat
22. Grind bourrelet
23. Thread nose for fuse
24. Squeeze on band and machine
25. Weld on base plate
26. Paint



Forming the cup: In piercing a 10½-in. round to form the cup for a 240-mm shell, the slug does not bottom on the die but rests on top of the boat-tail. The steel is caused to fill the boat-tail with little rearward flow as the punch descends and opens the cavity

SOME AMMUNITION stockpiling is practical, but we should be prepared to increase our manufacturing facilities quickly in a major crisis. We need a shell manufacturing policy which can be expanded in a hurry.

The heart of the matter is the manufacturing method. Should we retain hot forging or encourage cold forming? Both produce acceptable shells. The choice lies in the most prudent employment of wartime manpower, manufacturing facilities and materials.

Methods—For many years, shells have been pierced from a heated billet in the die of a hydraulic press. Modern practice calls for a square billet with rounded corners, the theory being that radial displacement of the metal to fill the die will impose less of a load on the punch than rearward extrusion.

In larger calibers there is a tendency to retain rounds, either parted off from the bar or cast and separated by flame cutting. Techniques of pierce and draw have been so improved that forge finish of the cavity is standard practice, machining being entirely eliminated in favor of a shot blast to clean up the scale and leave a surface like frosted silver.

Alternatives—Piercing the slug and drawing it through ring or roller dies is not the only way to forge a shell. It can be done on the upsetter by heating one end of a bar and using the cooler end as a tong hold. The shell is forged on the other end in a multiple punch and die sequence. For some sizes, the upsetter is not at a disadvantage, compared with pierce and draw.

Another contender is an adaptation of the seamless tube mill, called a hump mill, which makes cups from round stock. It may make a more concentric cup than pierce and draw.

Lost Steel—Concentricity is important because sufficient material must be left on shell forgings to keep the percentage of wasters within bounds. The main objection of cold-forming proponents is that 35 to 50 per cent of the hot-forged billet does not appear in the finished shell.

In defense of hot forging, steel removed from the blank in the machine shop is not lost. What

and Hot Forging Compare

Forging and Machining

1. Billet separation
2. Heat for forging
3. Descale
4. Pierce
5. Clean cavity
6. Draw through dies
7. Cool after forging
8. Shotblast cavity
9. Cut blank to length
10. Center base
11. Rough turn
12. Heat for nosing
13. Nose
14. Heat treat
15. Test for hardness
16. Second shotblast
17. Bore nose and chamfer
18. Finish turn the body
19. Finish base
20. Machine band seat
21. Thread nose for fuse
22. Grind bourrelet
23. Squeeze on band and machine
24. Weld on base plate
25. Paint

Typical cold-forming equipment: These 1500-ton presses at Mullins Mfg. Co. size the slug in the first operation on the 105-mm shell

is lost is the effort in man-hours and overhead on mill equipment, transportation and the like.

There are cogent arguments for retaining pierce and draw until experience and the advance of shell technology dictate a major shift.

Hot Flow—Steel at forging heat is in the austenitic condition, having crystalline characteristics similar to cool steel. The face-centered austenitic lattices readily accommodate themselves to the thrust of the hydraulic press or hammer. They flow and regroup in finer grain size.

The healing tendency of steel at forging heat shows up in a large capacity to bury imperfections, and in the virtual absence of notch sensitivity (especially characteristic of cold worked or any hard steel). For this reason, the mill product which serves the shell forge well and rarely opens up under the press might give trouble from stress raisers in cold forming

Clean Steel—The simple truth is that cold forming demands clean steel. The cleaner the steel, the lower the contents of phosphorus and sulphur; the smaller the percentages of residuals like chromium, copper and molybdenum, the better. In fact, if sulphur exceeds about 0.03 per cent the steel cannot be extruded cold successfully. The percentage of residuals should not be greater than 0.20 per cent for relatively trouble-free operation.

In wartime, a single supplier might not be able to furnish all the steel necessary. If the manufacturer procured from more than one source, his operations might have to be adjusted constantly.

Certain steels harden more under cold work than others, necessitating additional annealing (which might or might not help because of the risk of grain growth and the increased risk of cracking

The forging before machining: Diagram of a 240-mm shell forged from a slug weighing 530 to 550 lb. Before final inspection, between 226 and 246 lb of steel will be machined off. This 46 per cent clip from the original forging takes no account of wasters discarded as scrap

in the draws). Excessive work hardening could arise, for example, from the presence of silicon in excess of the 0.10 per cent recommended by one producer. He uses steel which is fully killed and hot topped. Insured are a finer grain and less risk of stringer inclusions ordinarily found in silicon-killed steels.

Work Hardening—The universal insistence on clean steel by cold extruders is significant. Although steel is highly plastic when caused to flow under pressure at room temperature, the healing qualities of austenitic structures at forging heat are less in evidence.

In cold extrusion, the ferrite and pearlite grains are severely distorted, resistance to differential movement increases, the yield point and hardness of the steel rise. As might be anticipated, percentage elongation is drastically reduced. An AISI 1015 steel in the annealed condition might have a yield strength of 30,000 psi, Rockwell B hardness of 58 and percentage elongation of 38. After hard drawing, these figures might be 70,000 psi, B-85 and 10.

Notch Sensitivity—We can assume that work hardening has an important bearing on notch sensitivity, and that the depth and sharpness of the notch will intensify the tendency to failure.

A stringer of slag, having little or no strength of its own, will produce a region of high stress prone to failure if the glass-like surface of the cold draw is invaded.

Surface defects are a menace in cold-forming — although in an early stage of the process, they may be removed by grinding.

Annealing—At normal temperatures, cold-worked steel is too rigid to allow rearrangement of the distorted grains. If cold work is continued, hardness and brittleness increase to the point of failure unless the part is annealed. The term "cold-forming" is misleading. The process does not avoid heating.

The effects of cold work can be removed by reheating between about 800 and 1200°F. But, in practice, a temperature of 1250°F is common, and one even finds annealing of cold-worked parts carried out at temperatures in excess of the transformation range (about 1450°F).

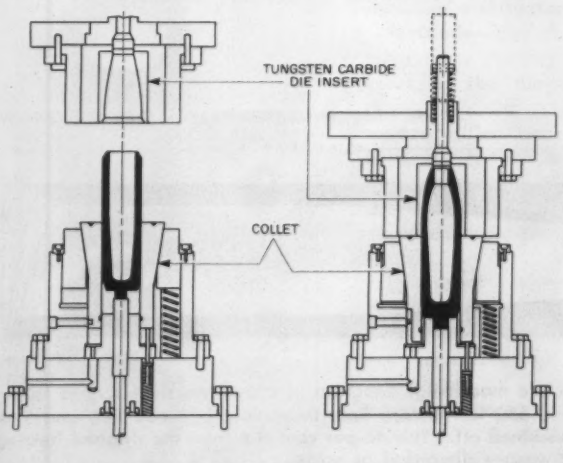
In a typical sequence of cold-forming operations on a 105-mm shell, there might be two full anneals (aimed at recrystallization and removal of effects of previous work) and one process anneal in the neighborhood of 850°F (intended to promote structural stability and relieve locked-in stresses). However, temperatures are not so high as in forging—nor does the formation of scale create the kind of problem raised by hot forging.

Cold Technique—The manufacture of a cold-formed 105-mm shell begins with the sawing of a slug from a 5-in. round. This is chamfered and buffed, pickled to remove scale and then given a phosphate coat, followed by a soap coat for lubrication in the die. The phosphate acts as a host to the lubricant in the first squeeze. From this sizing operation, the slug proceeds through a series of heavy squeezes in punch and die combinations aimed at producing an elongated, boat-tailed cylinder with tapering walls and a closed base.

Any attempt to change the shape of the cylindrical slug to a long, boat-tailed cylinder in one operation probably would be doomed because of the increase in resistance and mounting risk of cracking as manipulative work hardens the steel. We must subdivide the process for intermediate annealing and convenience in tooling.

In the early stages, the sized slug with its centered depression on the upper end is subjected to backward extrusion of the walls to form a heavy cup. Thereafter, this cup is extruded forward. The body of the shell is lengthened, as it runs ahead of the punch.

Finishing—In the remainder of the process, we try to avoid breaking the smooth skin with tools except where we cut the groove for the driving band. For this reason, the protuberances of the bourrelet are squeezed out (instead of be-



Forming the ogive: To produce the ogive from the tubular mouth of the cold formed or forged and partially machined shell, the body is held firmly in a collet chuck and a nosing die descends under the thrust of the press. On calibers above 5 in., this is usually done hot

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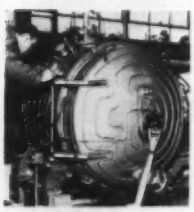

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ing machined out of the body) and later ground.

In this same operation, the flared lip left around the mouth after forward extrusion is ironed out in preparation for nosing. From this point on, operations for forged and cold formed steel are the same.

Middle Course—There is a practical middle course between hot forging and cold forming: The hot-cupping, cold-working process. The billet is scale-free heated to forging temperatures for hot forging, followed by a final cold forming. This type operation has been proved in practice with a recuperative furnace designed by The Lithium Co., Newark, N. J.

Gas equilibrium for scale-free heating is attained by the use of combustion products of the burner system in the first stage of reaction. The secondary (or complete combustion) stage, is done apart from the heating chamber, but in direct heat transfer relationship to it. The heat transfer medium is spread across the complete width of the hearth, providing uniform temperature throughout the heating chamber.

After hot forging, cold forming is retained for forward extrusion to length, expansion of bourrelet and nosing. By this combination, physical results are achieved equivalent to the cold process with much lower capital investment and substantially decreased cost.

Press Problem — This hot-cold method eliminates the problem of large, expensive and often unavailable presses — one of the major objections to the cold process. Press-capacity tests were made for the ASME Special Research Committee on the Forging of Steel Shells during the last war. They showed that the piercing punch (operating on a 5½-in. diameter slug, 6⅜-in. long) reached a peak thrust of about 180 tons in the later stages of forging the initial cup for a 105 mm shell blank. With the proper lubricant (such as lithium), this thrust can be decreased. For a similar piercing operation in the cold forming process, a 1000-to-1500-ton press is required.

Before we knew how to heat to forging temperatures without the formation of scale, shell lathes (with multitude tooling to take heavy cuts from the rough forged shell blanks) posed a problem. They were not readily available on short notice. With scale-free heating and hot lubrication, the lathe problem is by-passed and tool requirements minimized.

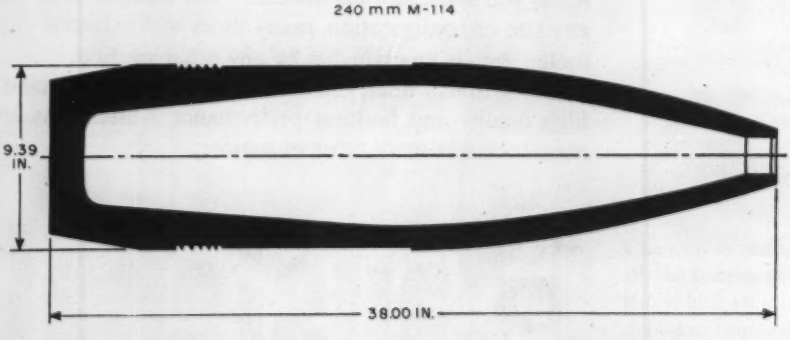
Hot Vs. Cold — Comparative tests were made of punch life, comparing the hot method with the cold: Greater punch life was realized with cold working. However, the amount of metal movement when it is cold is much less than when it is hot, and the punch is subjected to a greater volume of work in hot working. Carbide punches gave greatly increased punch life.

The middle course of hot cupping and cold finishing does not require the high quality steel necessary for cold formed shell: It is equivalent to the inexpensive steel that is used for the hot system.

The hot-cold method does not require as much steel per shell as the all-hot method. For instance, the finished weight of a 105 mm shell is about 25 lb. Hot forging, with the formation of scale, will require a 42-lb billet, entailing a scale and machining loss of 17 lb per shell, while both the cold forming and hot-cold method may get by with a scrap loss of 6 lb per shell.

Although there is no opportunity of correcting errors, since each cold-formed shell is finished in the die, the interior and exterior are satin smooth and of a uniformity which has obvious advantages from the gunner's standpoint. If, as some contend, cold forming is not readily adaptable to minor changes in shell design, it certainly is well adapted to radical changes.

But in view of the many problems encountered in machining and operational costs with the all-hot and all-cold methods, there's a good possibility that the middle course of hot-cold will become the accepted method.



The finished shell: Today, hot forging is favored by a wide edge of experience and possibly cost, but it wastes metal. During war the necessity for conserving manpower, metal and mill capacity may well favor cold forming. We must plan now with this possibility in mind

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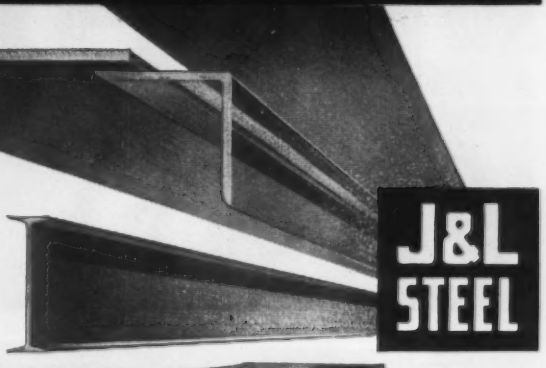

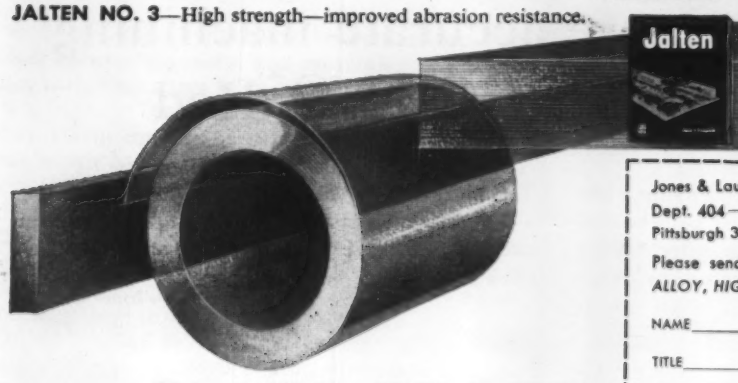

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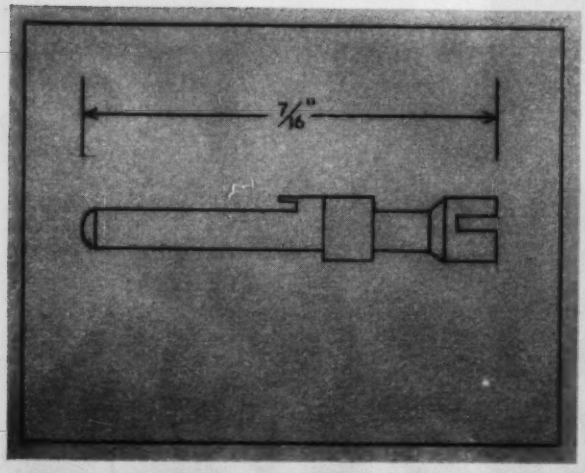
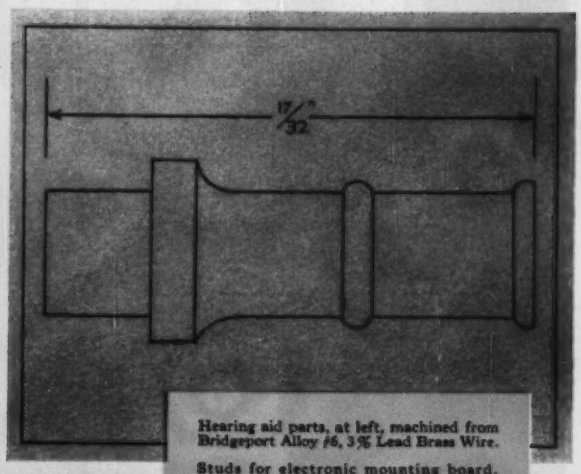
STEEL CORPORATION — *Pittsburgh*

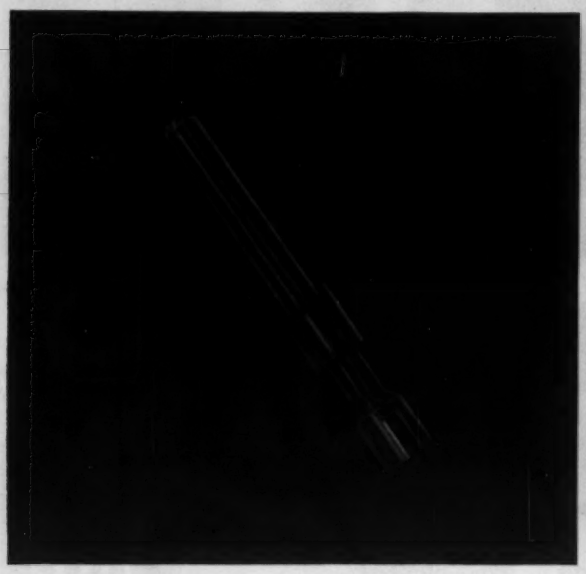
Matching metal to job with Bridgeport alloys

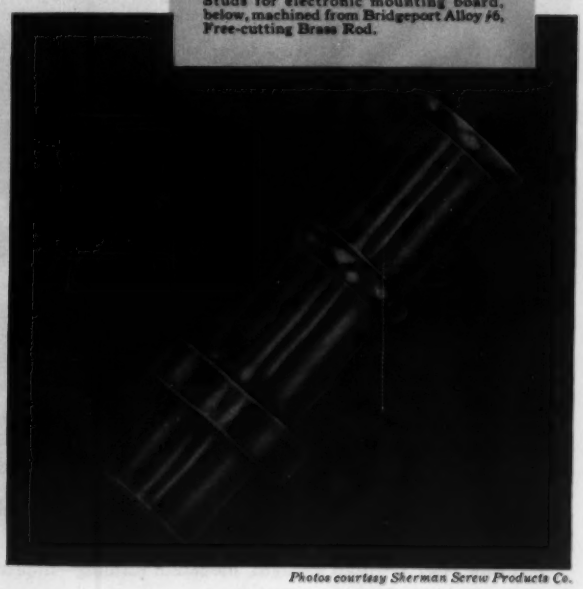




Hearing aid parts, at left, machined from Bridgeport Alloy #6, 3% Lead Brass Wire.

Studs for electronic mounting board, below, machined from Bridgeport Alloy #6, Free-cutting Brass Rod.





Photos courtesy Sherman Screw Products Co.

Faster, easier, more accurate machining with Bridgeport HIGH I. Q.* Rod

Matching metal to job with Bridgeport Alloys can cut your production costs . . . increase your profits. To get the job done right, tell Bridgeport your production and service requirements—Our Technical Service will gladly help you select, from a complete range of High I. Q. alloys, the particular one that will serve you best. Call your Bridgeport sales office today.

**High Inner Quality*

BRASS Bridgeport CO.

BRIDGEPORT BRASS

Offices in Principal Cities • Conveniently Located Warehouses

Bridgeport Brass Company, Bridgeport 2, Connecticut • In Canada: Noranda Copper and Brass Limited, Montreal

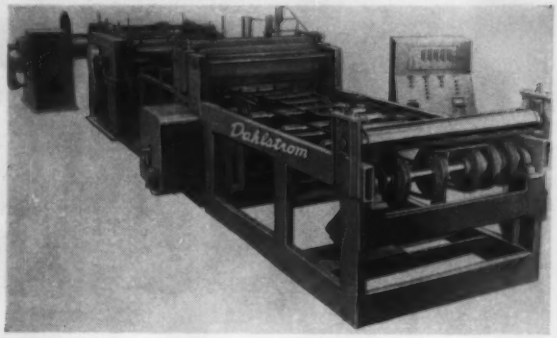
Electric Controller Gives Surface Measuring of Coiled Metals

Decoiling and shearing lines, roll feeding lines and roll forming lines can use a new method of lineal surface measurement.

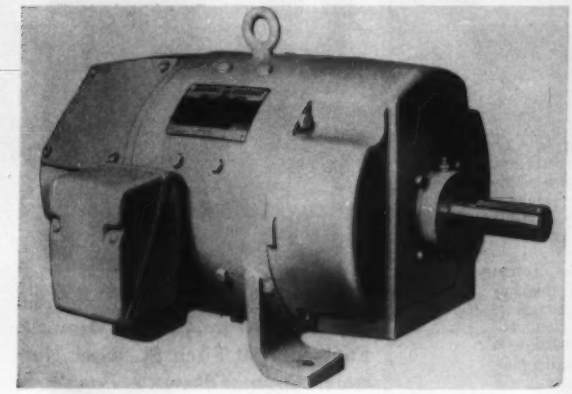
The unit has instantaneous change-over for different lengths and eliminates accumulated errors, length restrictions and troubles caused by light gages.

Two measuring controllers are used. One is a single preset counter for a continuously running decoiling and shearing line or a roll forming line.

A dual preset counter is sometimes needed for roll feed or decoiling and shearing lines. *Write*: Dahlstrom Machine Works Inc., 4227 W. Belmont Ave., Chicago, Ill. *Phone*: Spring 7-3670



Direct-Current Motors and Generators Offer Higher Speeds



All motor ratings from 1 to 150 hp and all generator ratings from ¾ to 100 kw are now built to the new NEMA standards.

The motors are for either constant or adjustable speed uses. Speed can be adjusted by armature voltage control, field strength control or any combination of both.

Field strength adjustment gives higher top speeds in constant horsepower uses.

All standard motors and generators have drip-proof enclosures and are guaranteed to have a 15-per-cent service factor. Reduced armature inertia permits faster speed of response. Class B insulation is used throughout. *Write*: General Electric Co., Schenectady 5, N. Y. *Phone*: 4-2211

Roll Clamp Rotates 360 Degrees

Rolls from 24 to 48 in. in diameter can be handled by this truck.

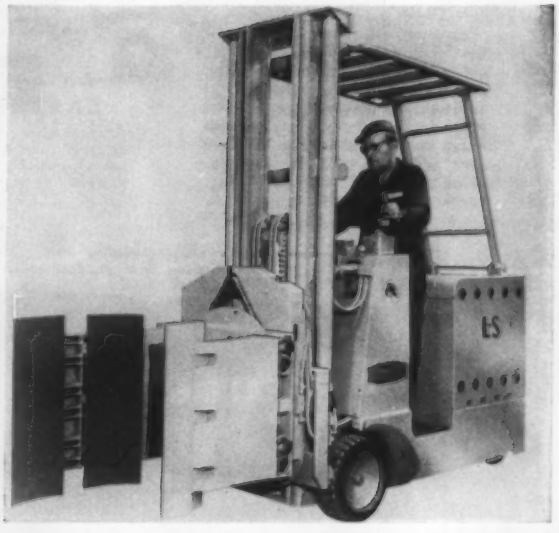
With the clamp, rolls standing vertically can be picked up when against a wall or another roll. Rolls lying horizontally can be picked up even when there is nothing solid behind them.

The clamp consists of two hydraulically operated arms which have a range of 22 to 52 in. One is a short thin arm containing a rubber pad; the other is longer and has two rubber pads.

The combination of a short and long arm enables the operator to remove rolls from storage that are immediately touching each other or a wall by approaching them from an angle.

Either arm can be moved. A selector valve enables the operator to make one arm adjustable and immobilize the other at the same time.

Chain and sprockets driven by a hydraulic motor rotate the clamp. *Write*: Dept. R-12, Lewis-Shepard Products Inc., Watertown, Mass. *Phone*: Watertown 4-5400



we want to contact

TOOL DESIGN ENGINEERS

with creative ability!

Are you looking for a greater opportunity to demonstrate your creative ability and ingenuity? Then by all means investigate the many openings — at many levels — in our Tool Design Department.

If you want challenging problems, we have them. If you want room for personal growth, we have it in abundance. And we can also offer *new, higher salary levels,* liberal employee benefit plans, the prestige of association with a world leader.

Unusually Diversified Department!

There's a definite reason why our department appeals to men of ability. Much of our work is in areas beyond the normal scope of most Tool Design Departments.

Heavy emphasis is, of course, on the design and development of both simple and complex tools, dies, fixtures and gauges. However, in addition, we develop complex test rigs and special devices for assembling, welding, machining. We have even developed radically new machine tools, gas atmosphere furnaces, and refrigeration units.

Many of our problems are so complex that we require specialists in the fields of hydraulics, electronics, instrumentation, machine design and metallurgy.

An Unusual Opportunity!

This merely hints at the diverse projects and problems of this unusual department. It suggests, however, the opportunities you will have to broaden your knowledge. It gives you an idea of the challenging nature of this work and how it will expand your talents.

There's real opportunity here. So contact us immediately. Whatever your past experience, there's probably an attractive spot where you can utilize your skills to the maximum.

Equally attractive openings for

ENGINEERS

with experience or training in the fields of controls, instrumentation, electricity, electronics, hydraulics or metallurgy.

Please send complete resume (including starting salary requirements) to Mr. E. M. Peterson, Dept. 41, Employment Department.

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DIVISION OF UNITED AIRCRAFT CORPORATION

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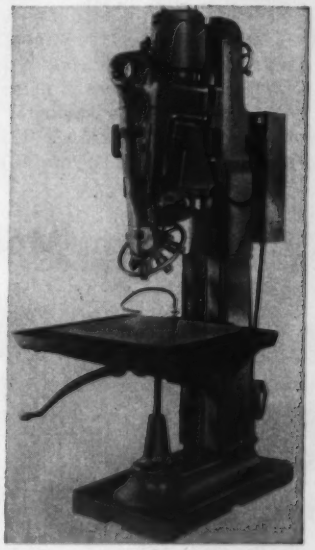
NEW PRODUCTS and equipment

Turret Drilling Machine

Up to six different operations can be done with only one handling of the work.

Spindle speeds, depths and reversals for tapping are preset for each spindle. They repeat automatically as the turret is indexed during successive cycles.



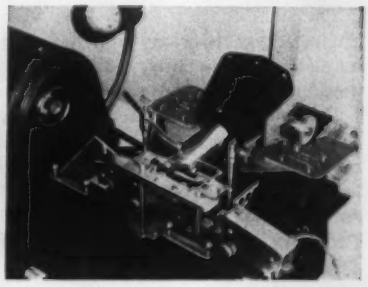
Spindle speeds are variable from 200 to 4000 rpm. *Write*: Howe & Fant Inc., 20 Fitch St., East Norwalk, Conn. *Phone*: Temple 8-3448

Balancing Machine

Miniature rotors weighing a fraction of an ounce can be balanced on a production basis with this machine.

The work supporting fixture is extremely light to hold "parasitic mass" to a minimum.

When balancing rotors less than ¾-in. in diameter without shaft ex-



Working from plant to yard, Verson Allsteel Press Company's big Y-200 rushes a 20,000 lb. load from welding plant to assembly plant.

In a plant or in a yard . . .

Clark's Y-200 just doesn't stop!

And here's why:

This big, tough planetary drive axle is a good example of the power packed into the Y-200. Here's a drive axle that provides top power utilization and serves the double purpose of reducing the torque load on the entire power train.

And here's more . . .

The Y-200 gives you proper weight distribution between drive and steer axle for maximum traction on any terrain. It offers the shortest turning radius of any comparable truck, a unique counterweight which reduces tail swing, and the heaviest uprights in the industry. Your benefit? A truck that will out-perform anything in its field. Your local Clark dealer will be happy to supply you with performance details—why not give him a call?

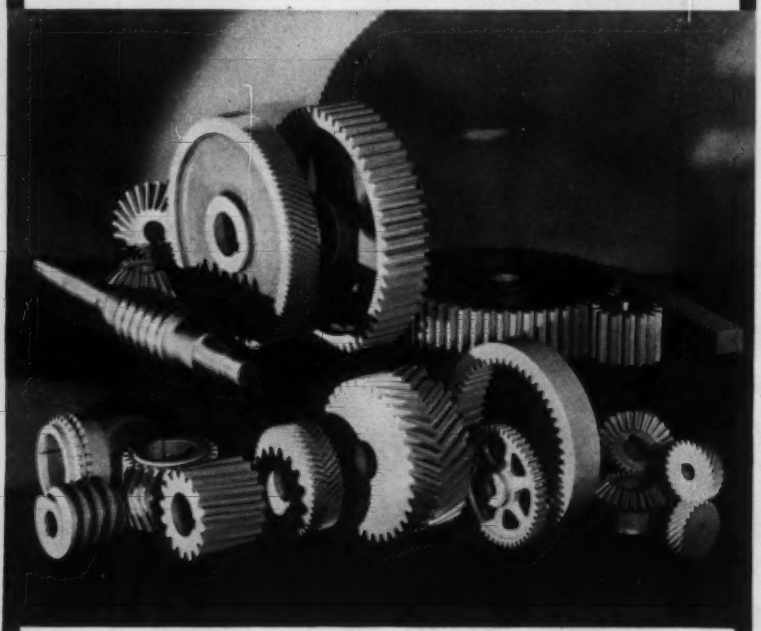
Industrial Truck Division CLARK EQUIPMENT COMPANY Battle Creek 26, Mich.

CLARK® EQUIPMENT

One of these 9

H&S Gears

is sure to answer your power transmission needs!



Spur • Racks • Bevel • Mitre • Internal • Worm • Helical • Spiral • Herringbone

Regardless of type, every H & S Gear is of the rugged, "husky" type. Heavy rims are well reinforced. Hubs are heavy in section, eliminating the need for key patches. All sharp corners are broken and generous fillets are provided.

H & S Gears are available of Steel, Hardened Steel, Alloys, Cast Iron, Bronze, Rawhide, Fibroil, or Bakelite.

Exacting care is exercised in every manufacturing step of H & S Gears. This insures *quietness of operation, uniform velocity ratio,* and *freedom from vibration.*

Whether you need a gear that weighs one ounce or 10 tons, why not put our years of gear engineering experience to work for you. Just send us the specifications or call. There's no obligation.

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NEW PRODUCTS and equipment

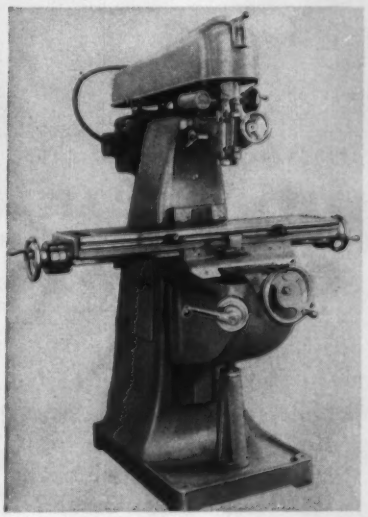
tensions, a fixed binocular-type light beam scanning arrangement is used.

Sensitivity of the balancer is high. It's limited only by the smoothness of the bearings or journal surfaces and by the small residual mass of the supporting structure. *Write*: R. B. Annis Co., 1101 N. Delaware St., Indianapolis 2, Ind. *Phone*: Melrose 5-2838

Vertical Milling Machine

This power-feed head machine has a large knee, saddle and table and giant-sized micrometer dials.

A 1-hp reversible motor drives the vertical head. Its feed rate is variable (from 0.002 to 0.008-in. per revolution).



The completely enclosed, hard-chrome-plated quill has 5½-in. of power travel and 800 lb of down thrust. *Write*: U. S. Burke Machine Tool Division, Cincinnati Mfg. Corp., Cincinnati, O. *Phone*: Bramble 5000

Gravity Wheel Conveyor

Conveyors for heavy duty come in 5 and 10-ft straight sections and 45 and 90-degree curves.

The side members are heavy-duty steel channels. Their capacity is a distributed load of about 1500 lb in 10 ft.

Conveyors are available in 12, 14, 18 and 24 in. widths. Wheel

Pangborn Rotoblast® speeds production at Beloit Iron Works!

Blast cleaning with a Pangborn Rotoblast Table-Room, Beloit Iron Works, Beloit, Wis., has upped production from 1.2 tons per hr. to 3.25 tons per hr.—an increase of 170%—while cutting labor costs!

And at Link-Belt, too!

Faster cleaning with Blastmaster Rotoblast Barrel at Olney Foundry Division, Link-Belt Company, Philadelphia, has stepped up production 20% to 25%!

Tables, rooms, barrels—whichever blast cleaning machine best fills your cleaning needs, Pangborn Rotoblast will speed *your* production.

Pangborn Rotoblast cuts operating time by cleaning *quickly*, throwing a heavy volume of abrasive over a large surface area. The result is higher production and, therefore, lower cleaning costs. Add the "plus" benefits of reduced labor costs and better cleaning quality and we think you'll agree Pangborn Rotoblast is worth investigating. Take a few seconds now to send for more information—it can save you thousands of dollars later.

Write for Bulletin 227 to PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn

BLAST CLEANS CHEAPER

Rotoblast Blastmaster® & Continuous-Flo Barrel

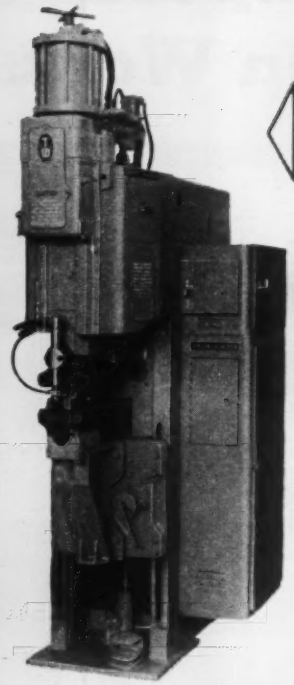
Rotoblast Tables & Table-Rooms

Special Blast Rooms & Cabinets

Pangborn Dust Control Equipment

Malleabrasive® Shot & Grit

Distributors for Malleabrasive and Tru-Steel Abrasives

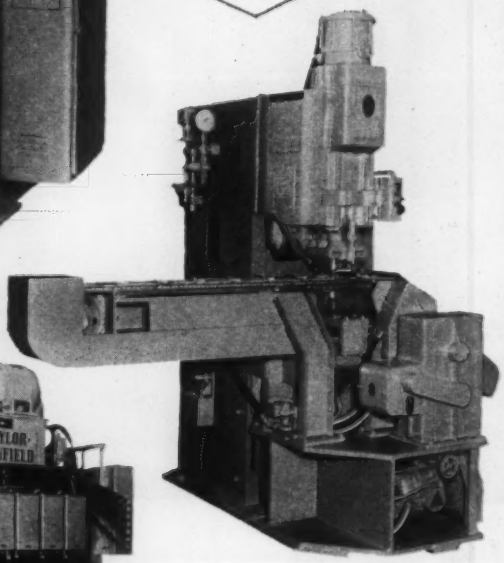


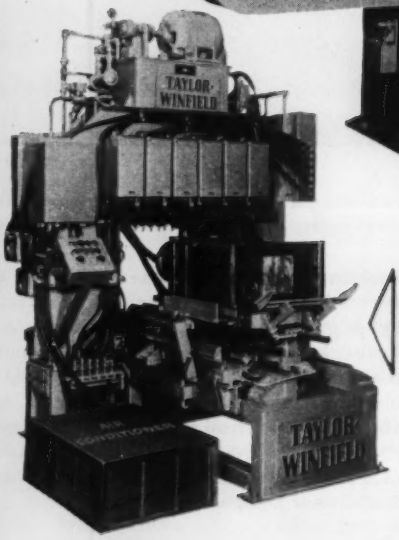
A STANDARD T-W RESISTANCE WELDER

Versatile uses; prompt delivery; lowest price.

OR A STANDARD WELDER MODIFIED

Special tooling; mechanized loading and unloading; increased production; low cost re-tooling.





OR A SPECIAL WELDER DESIGNED FOR YOUR WORK

Volume production at lowest unit cost.

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ELECTRIC RESISTANCE AND ARC WELDING MACHINES

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NEW PRODUCTS and equipment

patterns range from 6 to 36 wheels per foot. Axles are spaced on 3-in. centers. *Write*: Sage Equipment Co. Inc., 30 Essex St., Buffalo 13, N. Y. *Phone*: Elmwood 5242

Welding and Brazing Flux

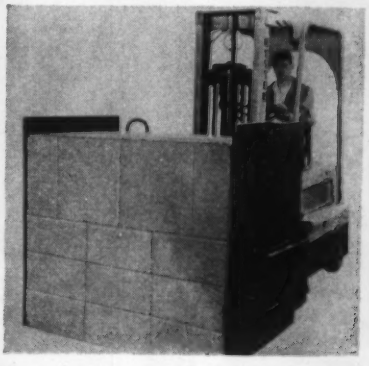
When used with either bronze or cast iron rod, a flux for cast iron brings the rod to the liquid point quickly. The flux wets the metal with ease and permits the metal to flow into small cavities.

It also permits the rod metal to amalgamate with the base metal to form a chemical bond. *Write*: American Solder & Flux Co., 19th & Willard St., Philadelphia 40, Pa *Phone*: Baldwin 6-1800

Lift Truck

Arms on 3000 and 4000-lb capacity lift trucks provide for rapid handling of cartons and packages without pallets.

Entire packages are held firmly; both spillage and damage is elim-



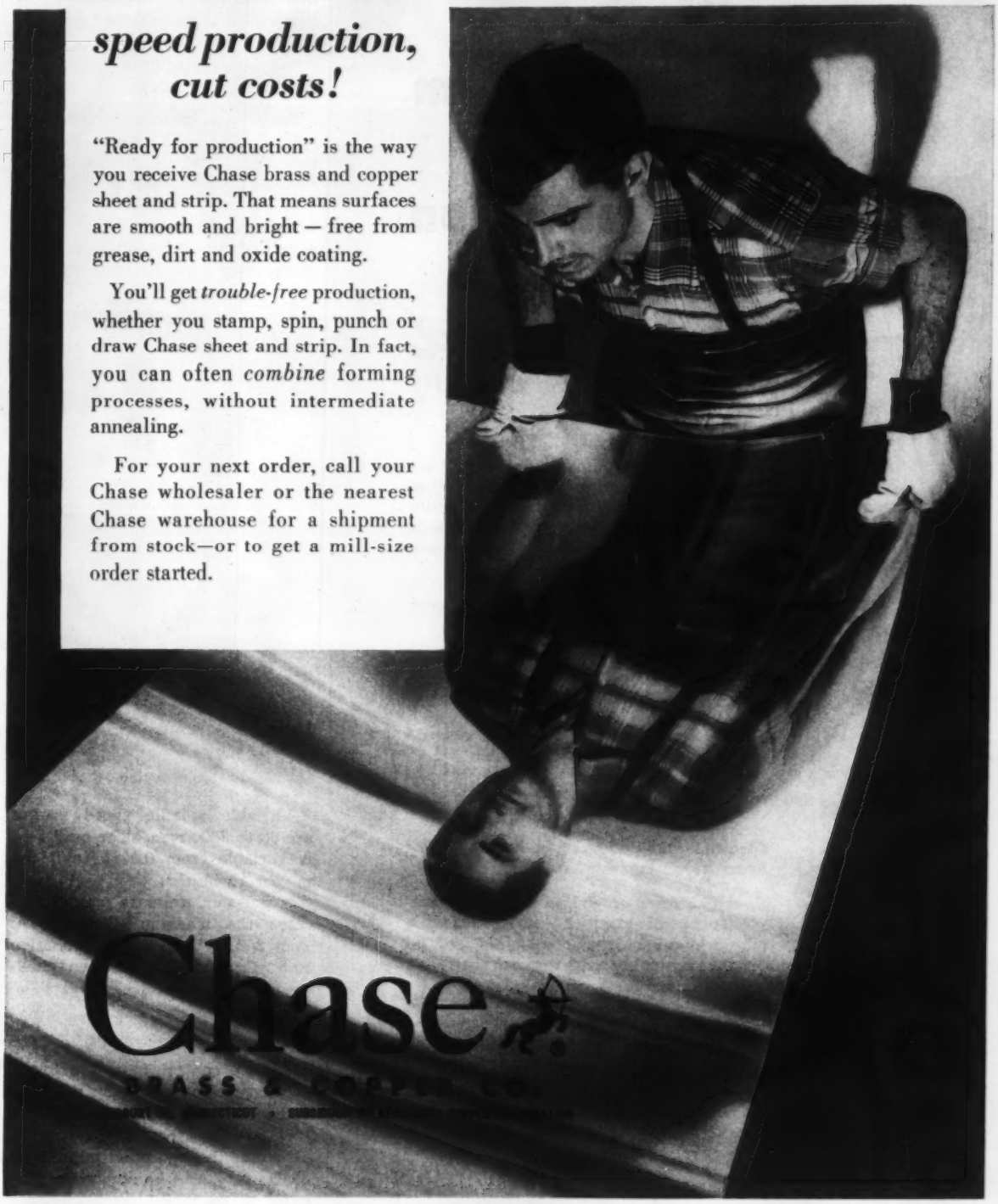
CLEANER, BRIGHTER CHASE® SHEETS

speed production, cut costs!

"Ready for production" is the way you receive Chase brass and copper sheet and strip. That means surfaces are smooth and bright — free from grease, dirt and oxide coating.

You'll get *trouble-free* production, whether you stamp, spin, punch or draw Chase sheet and strip. In fact, you can often *combine* forming processes, without intermediate annealing.

For your next order, call your Chase wholesaler or the nearest Chase warehouse for a shipment from stock—or to get a mill-size order started.



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there's no premium for precision

with

"Fischer Turned"

BRASS AND ALUMINUM NUTS

Costing no more than nuts produced by other, less accurate methods, Fischer precision-turned brass and aluminum nuts make possible important savings in assembly operations. Check these advantages:

Countersunk on both sides for faster starting . . .

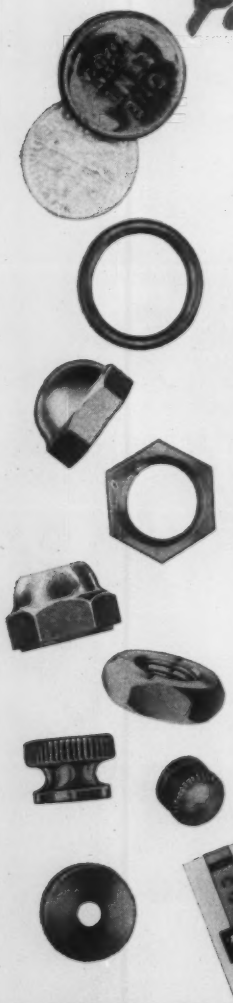
Tapped square with face to Class 2 tolerances for smoother, easier running and superior bearing surfaces . . .

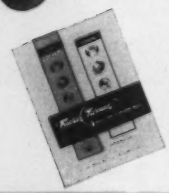
Turned from stock under basic size so they're never tight on wrenches . . .

Tapped through, eliminating "blanks" or rejects . . .

Cleaned and degreased before delivery to save you these operations.

Specify Fischer on your next order. A complete range of standard types and sizes is maintained in stock . . . "specials" can be produced quickly and inexpensively.





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TURNED NUTS Fischer SPECIAL MFG. CO. CINCINNATI, OHIO SINCE 1906

C-284-FS

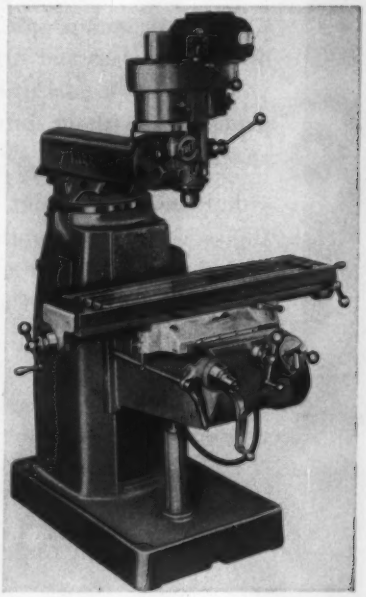
NEW PRODUCTS and equipment

inated. Arms operate rapidly and position quickly. *Write*: Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg. *Phone*: Atlantic 8-5011

Milling Machine

Toolrooms, experimental departments, pattern shops and production lines can use this versatile, vertical milling machine.

It has a universal head, an automatic collet closer, a roller spindle drive, a spindle brake and an enclosed micrometer depth stop.



Variable spindle speed ranges are 60 to 3300 rpm. The quill feed is variable from 0.0015 to 0.008-in. per revolution.

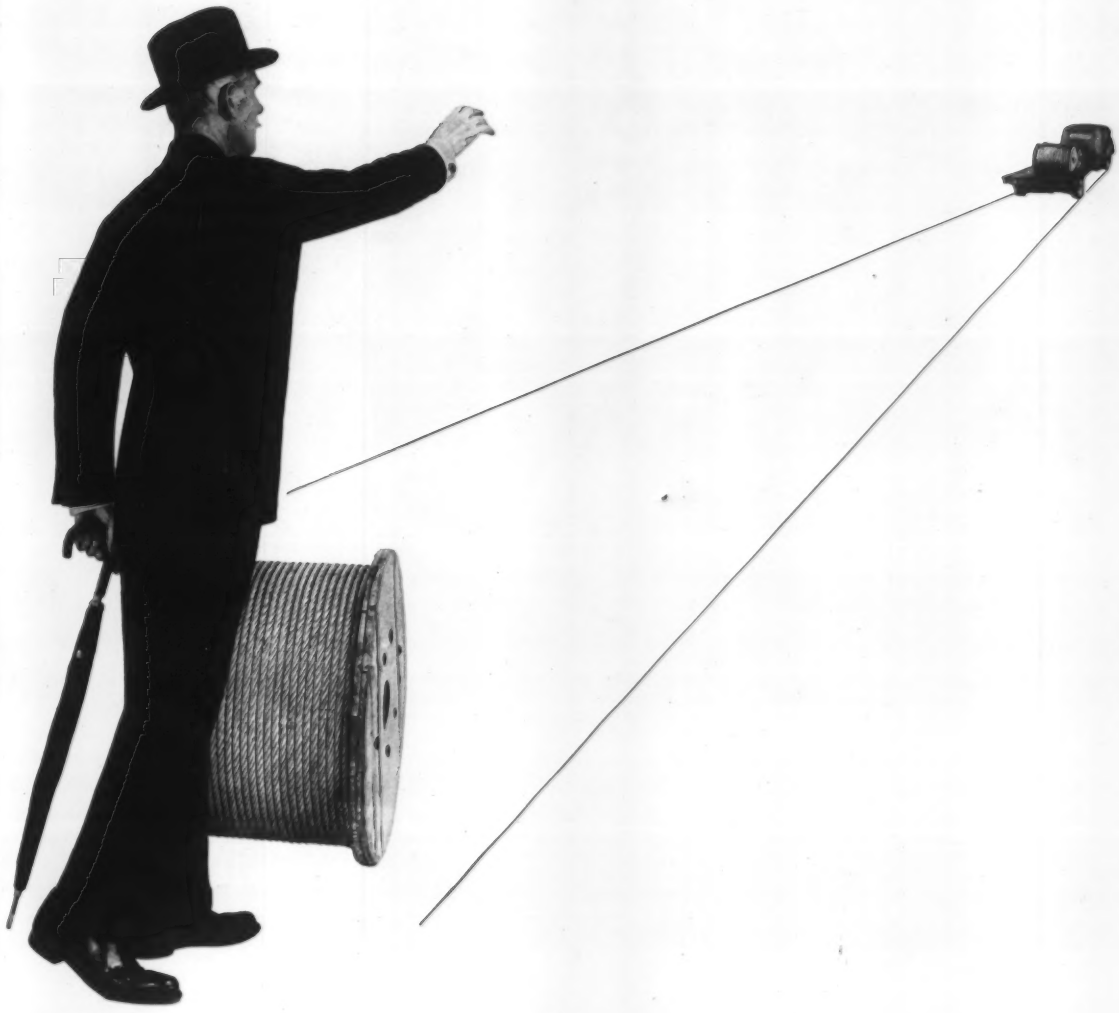
A one-shot pressure pump lubricates the machine. *Write*: *Tree* Tool & Die Works, 1600 Junction Ave., Racine, Wis. *Phone*: Melrose 4-1881

Band Saw

A foot control frees the hands in the production sawing of duplicate parts. It gives effortless control of the forward or return stroke of the hydraulic table.

The table can be stopped at any point in its travel.

The pedal gives two different types of table operation. For pro-



YOUR WICKWIRE ROPE DISTRIBUTOR SAVES YOU DOWN TIME

When the lack of the proper wire rope halts your production or your operations, thank your lucky stars that your helpful Wickwire distributor is only a quick phone call away. It's a wonderful feeling...to know you'll be getting exactly what you need from his warehouse stocks in only a few hours time.

Now contrast that with the cost in time, money and inconvenience of emergency shipments direct from a distant manufacturer.

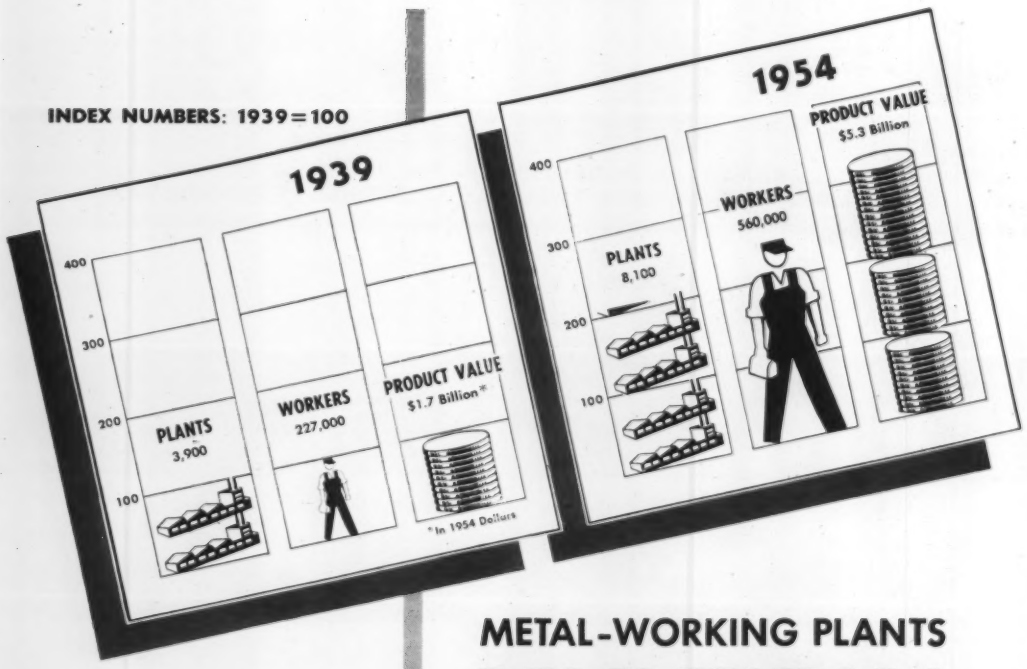
In addition to saving on down time, your Wickwire distributor effects further economies by recommending the wire rope that will give you the longest service life, by minimizing your bookkeeping, inventory maintenance and transportation costs. He keeps your reserve stocks for you so that you don't tie up capital in stand-by materials, warehouse space and unnecessary stock insurance and handling.

Your Wickwire Rope distributor is a good man to know. He's quality people handling quality products. Buy your wire rope and slings from him. You'll find that the many valuable services he offers far outweigh any apparent price advantage you might gain by buying direct.

CF&I WICKWIRE ROPE A CF&I PRODUCT

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

3152



METAL-WORKING PLANTS

MULTIPLY

IN NEW YORK STATE

New York State has more metal-working plants than any other state, and over the years they keep multiplying. In the past fifteen years, the State's metal-working establishments have more than doubled in number, while the value of their products (in constant dollars) *has more than tripled!* At the same time, workers in these industries have increased 140 per cent.

More industries . . . and a greater variety of industries . . . operate at a profit in New York State than in any other. This is true of thousands of metal-working plants. It can be true of yours.

Our Industrial Location Service is prepared to give you facts — professionally analyzed for your particular benefit — covering sites, raw materials, transportation, labor and power. Our booklet — "Industrial Location Services" — explains what we do and how you can use our knowledge. For your free copy write New York State Department of Commerce, Albany 7, New York.

SUCCESS BEGETS SUCCESS

NEW YORK STATE

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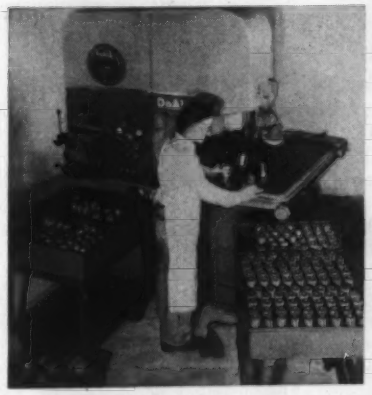
duction sawing, the foot control starts forward motion at a rate and pressure which have been preset on the instrument panel. Depressing the opposite pedal gives a full speed return stroke.



In contour sawing, the foot control stops and reverses the table feed as needed while the operator's hands are free to use the contour control and steady the workpiece. Return motion is at the same rate as the feed motion. Table motion ceases when the pedal is in neutral. *Write*: DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. *Phone*: Vanderbilt 4-1122

Nickel Plating

Full brightness, high leveling and exceptional speed are features of this new process. Output can be increased without investing in new equipment.

Almost any existing nickel plating process can be converted in a few days. No special equipment is needed. Tanks only have to be cleaned and bleached. Almost any rubber-lined tank previously used with bright nickel solution can be used.

New addition agents make it possible to use an activated carbon pack in the filter for the plating solution. This removes harmful organic contaminants. Periodic batch purification is not needed.

The process is effective within a wide current range. *Write*: Hanson-Van Winkle-Munning Co., Matawan, N. J. *Phone*: Matawan 1-1000

EXCEPTIONALLY HIGH QUALITY
HARDENED & GROUND SCREW MACHINE PRODUCTS

SPLINE SHAFTS
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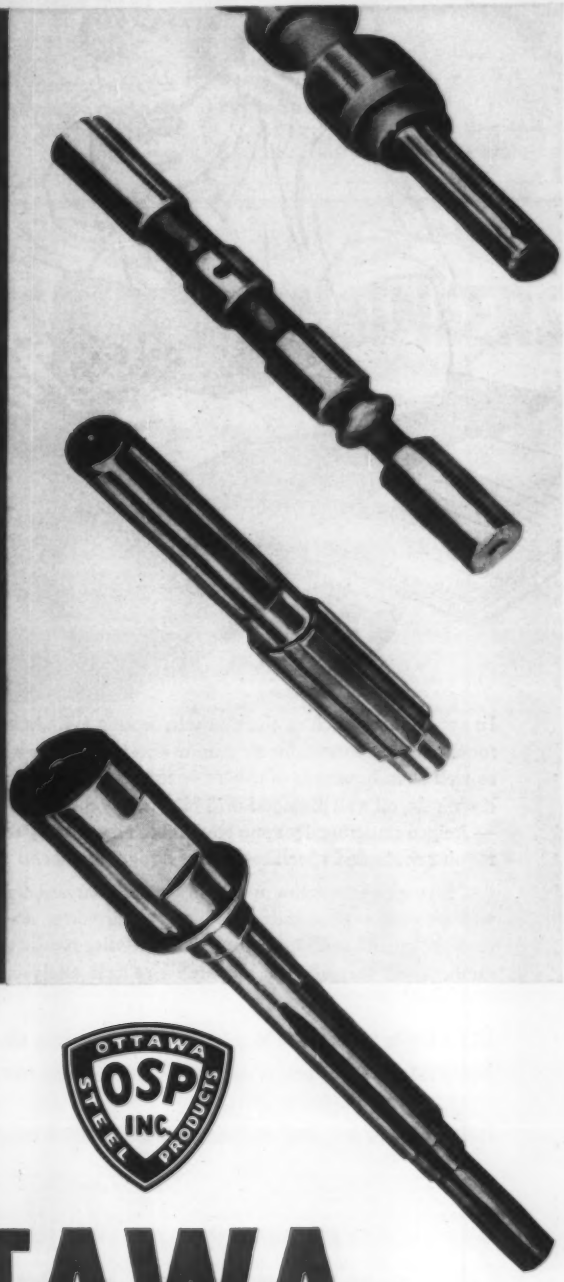
PUMP SHAFTS
ENERGY CELLS
CONTROL VALVES
ROTOR SHAFTS
ROTOR LINERS
OUTER RACES
VALVE TAPPET ROLLERS
ETC.



OTTAWA OSP INC. STEEL PRODUCTS

OTTAWA
STEEL PRODUCTS, INC. Grand Haven, Mich.

Required: Strength . . . Analysis . . . Quality . . . Economy
Specified: **ACIPCO** Centrifugally Spun **STEEL TUBES**

Photo courtesy
The Sheridan Iron Works
Champlain, N. Y.

In applications such as the many hydraulic cylinders for the stretch former for aluminum sheet shown here, as well as in hundreds of others — reformer tubes for chemicals, oil well diamond drill bits, heavy duty rolls — Acipco centrifugally spun steel tubes meet the rigid requirements and specifications of design engineers.

Strength properties and exact metal analyses, as well as economy of initial and operating costs, are readily "engineered" into hundreds of tubular product applications through the versatile size and analysis range of Acipco centrifugally spun steel tubes.

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Los Angeles 54, Calif.

NEW literature

Write directly to the company for a copy

Chuck Catalog

Independent, universal, combination, light-duty, and two-jaw chucks and face plate and boring mill jaws are specified in catalog E-200, 50 pages. Horton Chuck Division, E. Horton & Son Co., Windsor Locks, Conn.

Polishing

Sizing and finishing of precision shafts and pivots are covered in a 40-page booklet. Carl Hirschmann Co. Inc., 30 Park Ave., Manhasset, N. Y.

Air Tools

Grinders, hoists, sanders and polishers, wire-brush tools, drills, screwdrivers and impact wrenches are featured—bulletin 62, 40 pages. Aro Equipment Corp., Bryan, O.

Buffing and Grinding

A handy disc chart determines the surface speed of buffing and grinding wheels. Hanson-Van Winkle-Munning Co., Church St., Matawan, N. J.

Heat Exchangers

Advantages of aluminum in heat exchangers are described in a 16-page bulletin. Reynolds Metals Co., 2500 S. Third St., Louisville, Ky.

Spectrographic Supplies

A 24-page catalog lists pure materials and alloy standards, carbon and graphite rods and powders, preformed electrodes, photographic plates and chemicals. Jarrell-Ash Co., 26 Farwell St., Newtonville, Mass.

Leather Packings

Design and use of hydraulic and pneumatic leather packings are given in a 56-page handbook. J. E. Rhoads & Sons, 2100 W. 11th St., Wilmington 99, Del.

Centrifugal Blowers

Specifications for a line of blowers made of polyvinyl chloride to withstand chemical fumes and polluted air are given—bulletin 102, 20 pages. Industrial Plastic Fabricators Inc., Endicott St., Norwood, Mass.

Stainless Steel Strip

Uses, properties and corrosion resistance of 20 types of stainless strip are presented—32 pages. Superior Steel Corp., Carnegie, Pa.

Ovens and Furnaces

Electric ovens, furnaces, water and oil baths, humidity cabinets and incubators for production, pilot plants and laboratories are covered in a 68-page booklet. Blue M Electric Co., 138th & Chatham St., Blue Island, Ill.

Thread Gages

Information is given in a 32-page catalog on the use and selection of thread plug, thread ring, thread setting plug and plain cylindrical gages and plugs, rings and master setting gages. Besly-Welles Corp., Beloit, Wis.

Steel Shell Castings

Advantages of steel castings made in shell molds are given—bulletin 205, 12 pages. Electric Steel Foundry Co., 2141 N.W. 25th Ave., Portland, Oreg.

Beryllium-Copper Dies

Use of beryllium copper in forging dies, plastic molds and dies, steel and titanium forming and draw dies, and zinc diecasting dies is covered in a 4-page folder. Beryllium Corp., Reading, Pa.

High-Speed Steels

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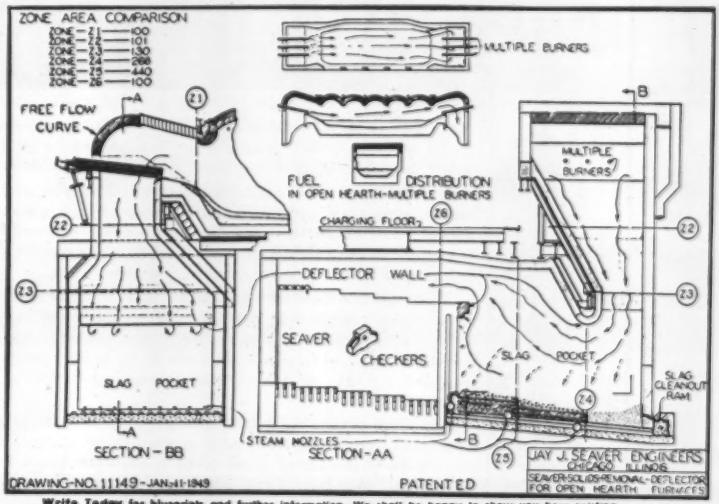

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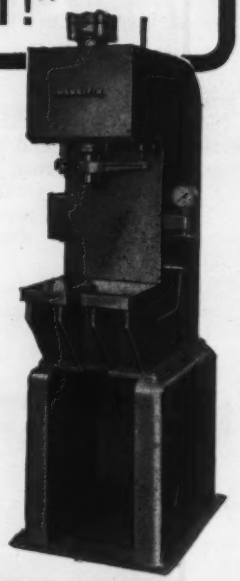

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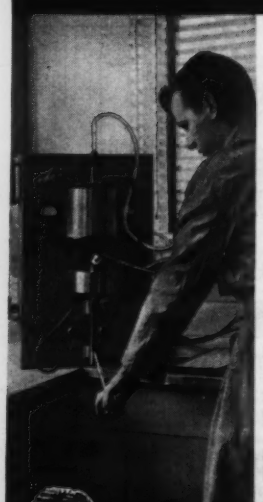

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NEW LITERATURE

tool and high-speed steels are given in a 16-page bulletin. Sales Department, Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa.

Strapping

Widths and thicknesses, number of feet per pound and tensile strengths of steel strapping are presented in a 2-page bulletin. Allegheny Steel Band Co., Box 716, Pittsburgh 30, Pa.

Wire Thread Inserts

Design data for wire threads are given in bulletin 652A, 22 pages. Military standards are presented in bulletin 689A, 16 pages. Heli-Coil Corp., Danbury, Conn.

Lathe Catalog

Engine, toolroom and turret lathes, shapers, pedestal grinders and drill presses and their attachments and accessories are covered in an 80-page catalog. South Bend Lathe Works, South Bend 22, Ind.

Heavy Press Extrusions

Design suggestions for extrusions and information on heavy presses are given in a 24-page booklet. Industrial Service Division PR 356, Kaiser Aluminum & Chemical Corp., 1924 Broadway, Oakland 12, Calif.

Automatic Lubricators

A line of high pressure lubricators that deliver metered quantities of oil on adjustable time cycles is described in bulletin 3A, 4 pages. Bijur Lubricating Corp., 151 W. Passaic St., Rochelle Park, N. J.

Wire Drawing Machines

Drum, block and combination type machines for drawing brass, copper, aluminum and other nonferrous metals are described in bulletin 786-W-3, 8 pages. Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Forged Fittings

Stainless and alloy steel fittings are described in bulletin S-1-55, 8 pages. Watson-Stillman Fittings Division, H. K. Porter Company Inc., P. O. Box 95, Roselle, N. J.

Electric Brake

Operating characteristics of an electric brake are presented in bulletin C-11, 8 pages. Star-Kimble Motor Division, Miehle Printing Press & Mfg. Co., 200 Bloomfield Ave., Bloomfield, N. J.

Sintered Bearings

Alloy selection for various applications and design requirements is giv-

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NEW LITERATURE

en in bulletin 18, 6 pages. United States Graphite Co., division of Wickes Corp., Saginaw, Mich.

Adhesives

Applications for adhesives, coatings and sealers in metalworking are presented in a 12-page bulletin. Adhesives & Coatings Division, Minnesota Mining & Mfg. Co., 411 Piquette Ave., Detroit 2, Mich.

Industrial Rubber Goods

Hose, belting, packing, molded and lathe-cut goods and mats are described in a 72-page catalog. Hamilton Rubber Mfg. Corp., Meade St., Trenton, N. J.

Fluxes

A circular describes 26 fluxes for use in welding steel, aluminum, silver, etc. Krembs & Co., 669 W. Ohio St., Chicago 10, Ill.

NEW BOOKS

Handbook of Barrel Finishing, Ralph F. Enyedy, Reinhold Publishing Co., 330 W. 42nd St., New York 36, N. Y. 255 pages, $7.50.

Every phase of barrel finishing (from cleaning and desludging to coloring, polishing and burnishing) is presented in a reference guide for industrial and methods engineers and finishing department supervisors.

Accident Prevention Manual for Industrial Operations, Third Edition, National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill. 1341 pages, $13.50.

The basic text for the safety man's shelf gives all the information needed to organize a comprehensive safety program and keep it going. Seventeen new sections include safety organization and education.

Steel Foundry Practice, John Howe Hall, Penton Publishing Co., Penton Bldg., Cleveland 13, O. 496 pages, $12.

This well-illustrated volume covers steel casting processes from sand selection to cleaning procedures.

Heat treatment and cast-weld construction are described with equilibrium diagrams and application photos. A chapter on centrifugal casting includes formulas for determining the speed of rotation.

A complete discussion of gates and heads is included and a chapter is devoted to flasks and rigging.

Melting is covered by chapters on open-hearth steelmaking, electric melting furnaces and the converter process.

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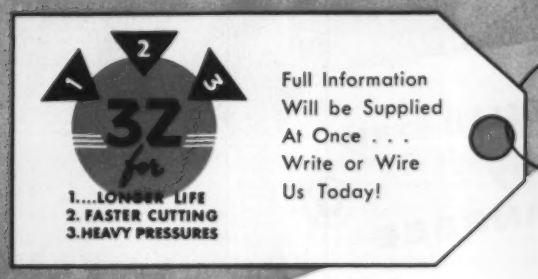

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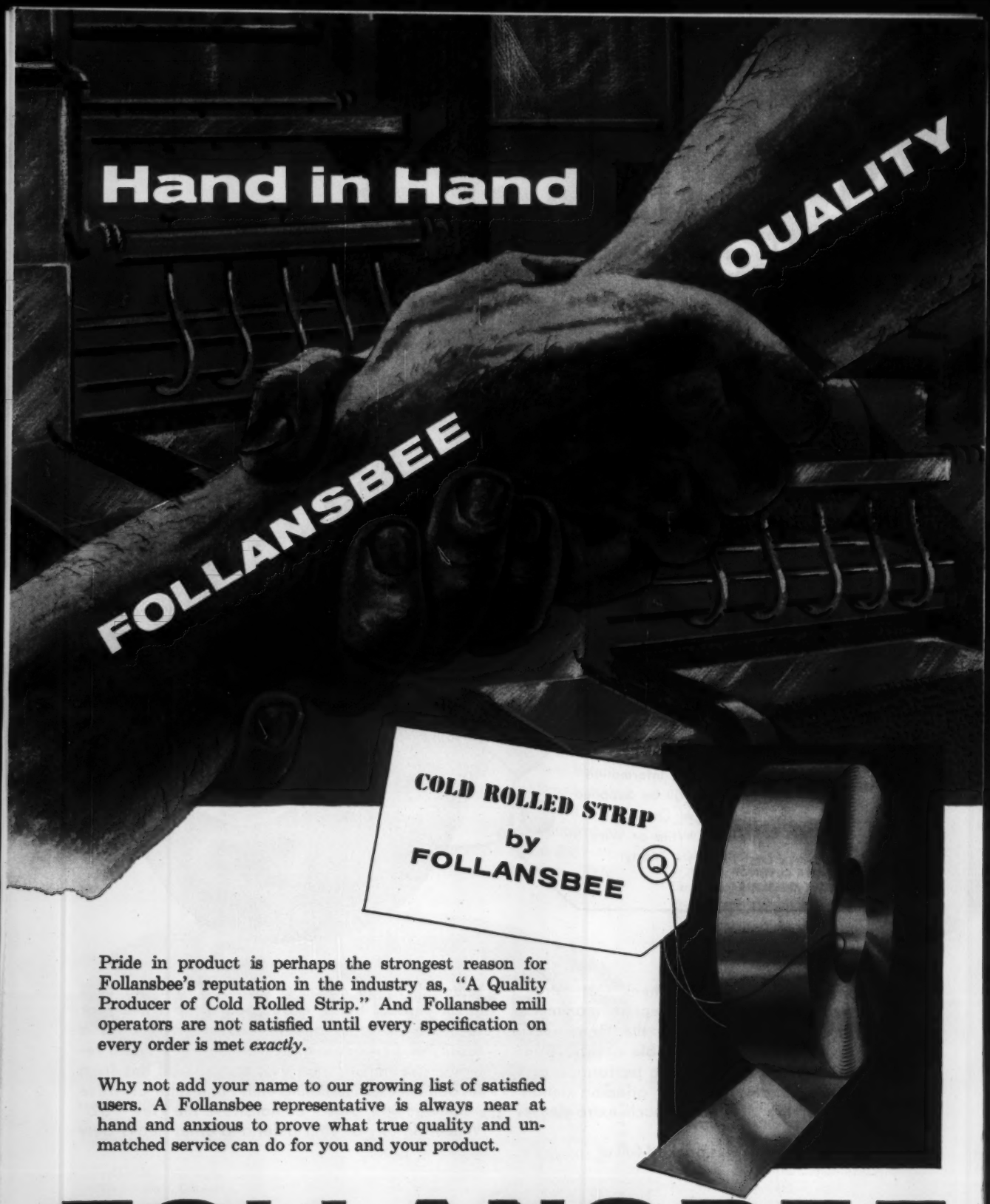

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STEEL

February 27, 1956

Market Outlook

WITH SPRING just around the corner, steelmakers seem noticeably confident of a snapback in automotive demand once the seasonal surge in car buying begins to cut into the large stockpile (over 850,000 autos) reportedly in the hands of dealers.

Retrenchment in automotive steel requirements continues, with car production still slowing down. Latest estimates place the weekly output of cars at 128,845. This compares with 136,307 two weeks ago, and 173,407 a year ago.

OPTIMISTIC NOTE—While autobuilders are cutting back on their current commitments to the steel mills, and, reportedly, are liquidating their excess steel inventories, they have indicated they will want their full steel quotas for May and June. This would seem to mean they anticipate a substantial quickening in their production schedules in about 60 days at latest.

Since the auto industry provides the largest consuming outlet for finished steel, any reversal in the trend of demand in that industry would be the signal for intensification of pressure for deliveries from other areas of consumption.

BUYING CAUTION— General consuming demand for sheets, the product most noticeably affected by the slower pace in the automotive industry, appears to be slightly less pressing. For instance, some of the sheet mills, in opening their books for second quarter business, found some customers, apart from automotive, who did not want all the tonnage offered them for April. Some did not wish to commit themselves beyond that month, preferring to await the approach of May lead time before taking action.

Despite these evidences of buying caution, also noted in bars to some extent, steel producers anticipate little trouble in booking all the tonnage they can handle in the second quarter, even though demand should lose vigor.

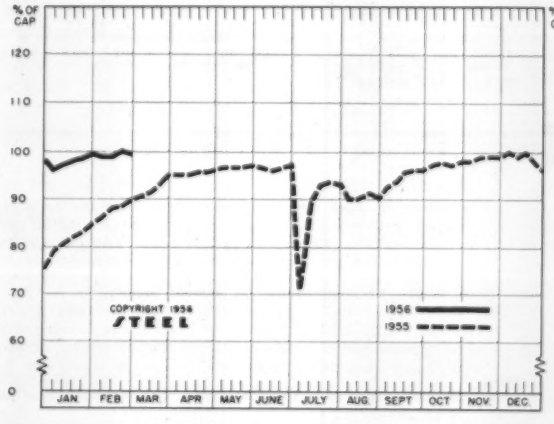
ACE-IN-HOLE—So far as mill shipments of sheets are concerned, consumers in general can't profit from the auto cutbacks before March and April. That's when the cancellations and deferments largely become effective. And, importantly, it is not likely any tonnage will go begging for buyers so long as over-all demand exceeds supply, as is the case, particularly in plates and structurals.

Even should demand for sheets shrink to the point where excess capacity were available, many of the sheet mills can be counted upon to quickly shift their production emphasis to plates, a product which is in particularly short supply and in which no relief is likely for months in present circumstances. Also, diversion of greater semifinished tonnage to production of structurals would take up some slack.

PRODUCTION—Steel mill operations eased ½-point last week, the national ingot rate slipping to 99.5 per cent of capacity. This is equal to a weekly output of 2,450,000 net tons.

SCRAP SLIPPING—The undertone of the scrap market continues weak. STEEL's composite on the steelmaking grades of scrap last week declined to $48.33 from $49. This is the fifth weekly drop in this composite since it attained an all-time high of $53.33. Other price composites are unchanged, with finished steel $127.91.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Feb. 26	Change	Same Week 1955	Same Week 1954
Pittsburgh	102	— 0.5*	90.5	83
Chicago	98.5	— 0.5*	93	83
Mid-Atlantic	101	0	87	72
Youngstown	100	0	92	74
Wheeling	99.5	— 1	94	68
Cleveland	104.5	— 0.5	90	73.5
Buffalo	105	0	100	68.5
Birmingham	95	— 1.5	86.5	80
New England	75	+ 2	90	58
Cincinnati	97	+ 2.5	86.5	71
St. Louis	106	+ 1.5	102	43.5
Detroit	102.5	— 0.5	88	72
Western	108	+ 2*	90	80.5
National Rate	99.5	— 0.5	90	72.5

INGOT PRODUCTION‡

	Week Ended Feb. 26	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	151.0†	151.5	153.9	136.4
NET TONS (In thousands)	2,425†	2,433	2,472	2,191

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,461,893 in 1956; 2,413,278 in 1955; 2,384,549 in 1954.

Metalworking Outlook—p. 63 Technical Outlook—p. 109

Price Indexes and Composites

FINISHED STEEL, Price Index (Bureau of Labor Statistics)

	Feb. 21 1956	Feb. 14 1956	Month Ago	Feb. Average
(1947-1949=100)	157.1	157.1	155.8	157.1

AVERAGE PRICES of Steel (Bureau of Labor Statistics)

Week Ended Feb. 21

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parenthesis. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, Standard, No. 1	$4.800	Sheets, Electrical	$10.175
Rails, Light, 40 lb	6.217	Strip, C.R., Carbon	8.243
Tie Plates	5.625	Strip, C.R., Stainless, 403 (lb)	0.444
Axles, Railway	8.350	Strip, H.R., Carbon	5.606
Wheels, Freight Car, 33 in. (per wheel)	52.50	Pipe, Black, Buttweld (100 ft)	16.997
Plates, Carbon	5.200	Pipe, Galv., Buttweld (100 ft)	21.137
Structural Shapes	4.867	Pipe, Line (100 ft)	167.250
Bars, Tool Steel, Carbon (lb)	0.460	Casing, Oil Well, Carbon (100 ft)	165.120
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.560	Casing, Oil Well, Alloy (100 ft)	244.670
Bars, Tool Steel, H. R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.185	Tubes, Boiler (100 ft)	39.470
Bars, Tool Steel, H.R., Alloy, High Speed W-18, Cr 4, V 1 (lb)	1.680	Tubing, Mechanical, Carbon	20.980
Bars, H.R., Alloy	9.425	Tubing, Mechanical Stainless, 304 (100 ft)	178.897
Bars, H.R., Stainless, 303 (lb)	0.450	Tin Plate, Hot-dipped, 1.25 lb	8.933
Bars, H.R., Carbon	5.500	Tin Plate, Electrolytic, 0.25 lb	7.633
Bars, Reinforcing	5.313	Black Plate, Canmaking Quality	6.733
Bars, C.F., Carbon	8.800	Wire Drawn, Carbon	8.575
Bars, C.F., Alloy	12.275	Wire, Drawn, Stainless 430 (lb)	0.590
Bars, C.F., Stainless, 302 (lb)	0.475	Bale ties (bundle)	6.473
Sheets, H.R., Carbon	5.345	Nails, Wire, 8d Common	8.595
Sheets, C.R., Carbon	6.214	Wire, Barbed (80-rod spool)	7.847
Sheets, Galvanized	7.770	Woven Wire Fence (20-rod roll)	18.635
Sheets, C.R., Stainless 302 (lb)	0.588		

STEEL's FINISHED STEEL PRICE INDEX*

	Feb. 22 1956	Week Ago	Month Ago	Year Ago	5-Yrs. Ago
Index (1935-39 av.=100)	209.10	209.10	209.10	194.53	171.92
Index in cents per lb	5.665	5.665	5.665	5.270	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$127.91	$127.91	$127.91	$117.82	$106.32
No. 2 Fdry, Pig Iron, GT	58.99	58.99	58.99	56.54	52.54
Basic Pig Iron, GT	58.49	58.49	58.49	56.04	52.16
Malleable Pig Iron, GT	59.77	59.77	59.77	57.27	53.27
Steelmaking Scrap, GT	48.33	49.00	51.50	37.33	44.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Feb. 22 1956	Week Ago	Month Ago	Year Ago	5-Yrs. Ago
Bars, H.R., Pittsburgh	4.65	4.65	4.65	4.30	3.70
Bars, H.R., Chicago	4.65	4.65	4.65	4.30	3.70
Bars, H.R., deld. Philadelphia	4.90	4.90	4.90	4.55	4.18
Bars, C.F., Pittsburgh	6.25*	6.25*	6.25*	5.40	4.55
Shapes, Std., Pittsburgh	4.60	4.60	4.60	4.25	3.65
Shapes, Std., Chicago	4.60	4.60	4.60	4.25	3.65
Shapes, deld., Philadelphia	4.88	4.88	4.88	4.53	3.90
Plates, Pittsburgh	4.50	4.50	4.50	4.225	3.70
Plates, Chicago	4.50	4.50	4.50	4.225	3.70
Plates, Coatesville, Pa.	4.80	4.80	4.80	4.225	4.15
Plates, Sparrows Point, Md.	4.50	4.50	4.50	4.225	3.70
Plates, Claymont, Del.	4.80	4.80	4.80	4.225	4.15
Sheets, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.60-3.75
Sheets, H.R., Chicago	4.325	4.325	4.325	4.05	3.60
Sheets, C.R., Pittsburgh	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Chicago	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Detroit	5.325-5.425	5.325-5.425	5.325-5.425	5.10	4.55
Sheets, Galv., Pittsburgh	5.85	5.85	5.85	5.45	4.80
Strip, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.75-4.00
Strip, H.R., Chicago	4.325	4.325	4.325	4.05	3.50
Strip, C.R., Pittsburgh	6.25	6.25	6.25	5.75	4.65-5.35
Strip, C.R., Chicago	6.25-6.35	6.25-6.35	6.25-6.35	5.85	4.90
Strip, C.R., Detroit	6.35	6.35	6.35	5.90	4.35-5.60
Wire, Basic, Pittsburgh	6.60	6.60	6.60	5.75	4.85-5.10
Nails, Wire, Pittsburgh	7.60	7.60	7.60	6.85	5.90-6.20
Tin plate (1.50 lb), box, Pitts.	$9.45	$9.45	$9.45	$9.05	$8.70

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, Forging, Pitts. (NT)	$84.50	$84.50	$84.50	$78.00	$66.00
Wire rods, ⅜-⅝" Pitts.	5.375	5.375	5.375	4.675	4.10-4.30

PIG IRON, Gross Ton					
Bessemer, Pitts.	$59.50	$59.50	$59.50	$57.00	$53.00
Basic, Valley	58.50	58.50	58.50	56.00	52.00
Basic, deld. Phila.	62.16	62.16	62.16	59.66	56.39
No. 2 Fdry, Pitts.	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Chicago	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Valley	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, deld. Phila.	62.66	62.66	62.66	55.16	56.89
No. 2 Fdry, Birm.	55.00	55.00	55.00	52.88	48.88
No. 2 Fdry (Birm.) deld. Cin.	62.70	62.70	62.70	60.58	55.58
Malleable, Valley	59.00	59.00	59.00	56.50	52.50
Malleable, Chicago	59.00	59.00	59.00	56.50	52.50
Ferromanganese, Duquesne	205.00†	205.00†	205.00†	190.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commision)					
No. 1 Heavy Melt, Pitts.	$47.50	$49.00	$50.50	$38.50	$45.00
No. 1 Heavy Melt, E. Pa.	50.50	51.00	55.00	39.50	43.50
No. 1 Heavy Melt, Chicago	47.00	47.00	49.00	34.00	43.50
No. 1 Heavy Melt, Valley	52.50	52.50	54.50	37.50	45.00
No. 1 Heavy Melt, Cleve.	49.50	49.50	52.00	34.00	44.00
No. 1 Heavy Melt, Buffalo	46.50	46.50	47.50	32.50	44.00
Rails, Rerolling, Chicago	66.50	66.00	67.50	49.50	52.50
No. 1 Cast, Chicago	46.50	46.50	49.50	40.00	49.00

COKE, Net Ton					
Beehive, Furn, Connlsvl.	$14.125	$14.125	$14.125	$13.75	$14.75
Beehive, Fdry, Connlsvl.	16.50	16.50	16.50	16.75	17.50
Oven, Fdry, Chicago	27.00	27.00	27.00	24.50	21.00

Daily Nonferrous Price Record

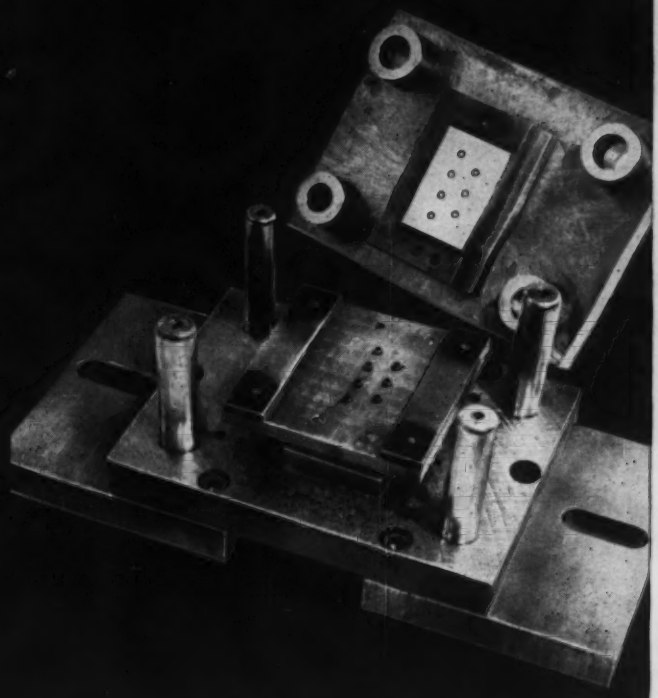
	Price Feb. 21	Last Change	Previous Price	Jan. Avg.	Dec. Avg.	Feb. 1955 Avg.
Copper	46.00-52.00	Feb. 20, 1956	43.00-52.00	46.700	46.053	33.000
Lead	15.80	Jan. 13, 1956	16.30	15.960	15.358	14.800
Zinc	13.50	Jan. 6, 1956	13.00	13.440	13.000	11.500
Tin	100.875	Feb. 20, 1956	101.00	105.067	107.98	90.908
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	64.500
Aluminum	24.40	Aug. 8, 1955	23.20-24.40	24.400	24.400	23.200
Magnesium	32.50	Aug. 16, 1955	28.50	32.500	32.500	27.000

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, 99.8%, Freeport, Tex.

What You Can Use the Markets Section for:

- **A source of price information.** Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.** Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.** Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.** Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**

FIELD REPORT: NO. 87



WHICH DIE STEEL WOULD YOU USE HERE to boost production per grind 500%?

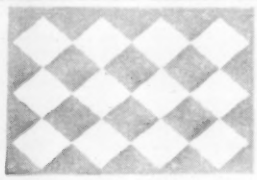
These tools blank out dead soft brass washers, .170″ O.D. x .100″ I.D., .009″ thick, on a punch press at 186 strokes per minute. It is an exacting job for a couple of reasons. First, it involves a government contract and strict delivery schedules have to be maintained. Then too, the punch and die are set up to blank seven washers per stroke and have to do this for many millions of pieces . . . and still remain within burr limitations set up by the government. Performance from the steel used in the past was far from satisfactory . . . to maintain schedules, production had to be substantially increased.

Suppose the decision were up to you. Which die steel would you be willing to recommend for steady, trouble-free production?

In this Field Report from customer files, here's what happened: The Carpenter Matched Set Diagram was consulted and Carpenter No. 610 (Air-Wear) was selected. Since then No. 610 has enabled the Company to hold delivery schedules comfortably . . . racking up increases in production per grind as high as 500%. And this is especially significant when you realize that five hours' downtime is involved each time the tools have to be reground. Total parts to date: 5,500,000 . . . and the tool is still good for about 15 regrinds of .003″ each.

Why make the tough decisions alone, when Carpenter's service organization is sincerely interested and equipped to work with you? A move in the right direction would be to call your nearest Carpenter Mill-Branch Warehouse, Office, or Distributor, now. *The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.*

Your toolroom can use Carpenter Matched Tool and Die Steels to:



Reduce hardening hazards
Minimize machine downtime
Boost output per grind
Improve product quality

Carpenter STEEL

Matched Tool and Die Steels

IMMEDIATE DELIVERY from local warehouse stocks—Export Address: Port Washington, N. Y.—"CARSTEELCO"

Nonferrous Metals

Hope for a more relaxed copper market in 1956 begins to wane as high-level demand, both foreign and domestic, is keeping supplies of the metal in a critical condition

Nonferrous Metal Prices, Pages 158 & 159

WHY DID PRIMARY copper prices jump from 43 to 46 cents a pound on Feb. 17? The answers point out how complex the world copper market has become.

It is true that some pressure was being exerted by Chile. Oscar Herrera, Chile's minister of economy, told reporters some 11 days ago that his country would like to have the price of primary American copper raised 3 to 5 cents a pound. There were hints that unless this happened more copper might find its way into the foreign markets. (The U. S. receives only one-third of Chile's copper.)

Other Pressures—Anaconda Co. raised its prices—followed by Kennecott and Phelps Dodge (Feb. 21)—because it had no choice. The London market quotation of about 50 cents a pound would sooner or later attract copper from domestic channels. With foreign demand continuing at high levels, it was a matter of when to raise prices rather than "should we." In all probability, the decision to jump 3 cents a pound was made before Mr. Herrera began talking to reporters.

No primary producer wants to raise prices. Labor negotiations will commence in July. Each increase gives labor a bigger club to demand a larger raise. Booming profits will add fuel to the fire, too. Producers are quick to admit that prices are already too high and realize that each price hike puts more research departments to work looking for substitute materials.

Blast—Herbert Barchoff, president, Copper & Brass Warehouse Association, says: "The government's refusal to release 100,000 tons of stockpiled Chilean copper last fall contributed to the 3-cent-a-pound increase." Mr. Barchoff and other industry spokesmen petitioned President Eisenhower in September to release the stockpile copper on the basis of a "national emergency." Arthur S. Flemming, Office of Defense Mobilization director, refused. He said that it would be illegal under present stockpile law.

"Had the release been granted," says Mr. Barchoff, "The cost would not be spiraling today, and our economy would not be paying the price for it. Not only will civilian goods cost more, but the defense budget will be unnecessarily increased. The copper situation has become the best selling point for aluminum."

Continued Demand—There is little doubt that every pound of copper that is brought out of the ground for the next 25 years will be in demand. Reason: There are too many costly complications involved in expanding copper facilities and/or bringing in new ones. Anaconda brought this point home last week when it announced a new mine project. Roy H. Glover, chairman, unveiled a plan which will take some $52.9 million to get facilities to mine and beneficiate the copper ores in a district some 18 miles north of Potrerillos, Chile. The mine will be near the Indio Muerto mountain. Exploration work has been going on since 1952. It will take four or five years to get the new mine going. Two more years will be required to get maximum production. In all probability, this mine will not add to the over-all copper supply. It will simply replace a mine that has dried up during the same period. Anaconda reports that projected installations (Indio Muerto mountain) and planned revisions of the nearby Potrerillos plant are expected to provide an ore capacity of 25,000 tons a day. The estimated annual production is about 100,000 tons of fine copper.

Statistical Rundown—World production of primary and secondary crude copper in January totaled 245,943 tons, reports the Copper Institute. This was a 20,116-ton rise over December totals. But deliveries (see table) to fabricators dropped from 247,368 to 242,425 tons due to strikes.

Outlook—Copper producers are caught in a web of circumstances. 1. There is not enough refined copper to satisfy world demand. 2. The foreign market continues to put added pressure on domestic copper sources. 3. The Laurel Hill strike cost this country some 15,000 tons of the red metal. 4. If July labor negotiations do not go smoothly, a major strike could develop. Food for thought: As long as world politics and markets, labor inharmony and unprecedented demand stay on the scene, copper supply and demand cannot possibly come into balance. Outlook: The copper industry could be in a state of frenzy throughout 1956.

World Copper Production Up; Deliveries Dip

	—Crude Production— Primary	Secondary	Refined	Deliveries to Fabricators
January, 1956	233,972	11,971	237,300	242,425
December, 1955	214,114	11,713	250,349	247,368
November, 1955	229,376	9,304	239,963	248,827

Source: Copper Institute

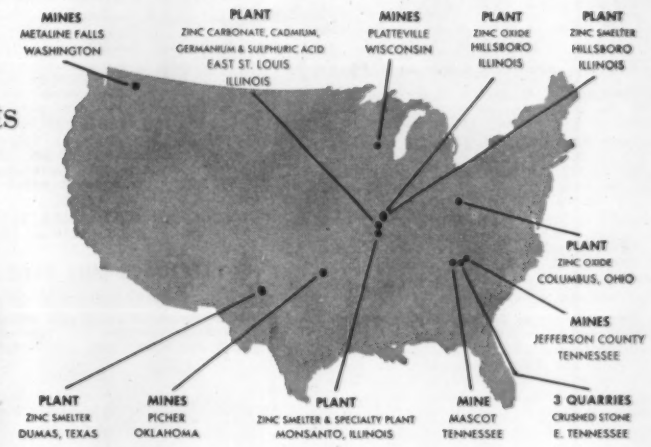
Market Memos

- The combined total of ingot brass and bronze shipped during January was 27,736 tons, compared with 21,448 tons in December, reports the defense council of the ingot and brass industry. This represents about 95 per cent of the deliveries made to all industry. A total of 298,406 tons was shipped in 1955.

- The aluminum industry recorded the second best month in its history: 140,394 tons were produced, reports the Aluminum Association. December total racked up the record with 140,748 tons. During January, 1955, 128,203 tons were produced.

- The lead and zinc markets are beginning to show signs of life as users place March orders. High level foreign demand for the two metals and the General Services Administration's willingness to enter the market continue to provide a substantial floor.

American Zinc and its products *from* A to Z



FORT SMITH, ARKANSAS, PLANT OPERATES UNDER CONTRACT WITH AMERICAN ZINC

Zinc smelter, owned and operated by the Athletic Mining and Smelting Company, produces Prime Western slab zinc for American Zinc exclusively. Plant has roasting and nodulizing equipment, as well as horizontal retort furnaces. For complete picture of American Zinc's own operations, see map above.

PRODUCERS OF

ALL GRADES OF SLAB ZINC
ZINC ANODES (Plating & Galvanic)
METALLIC CADMIUM
SULPHURIC ACID
LEAD-FREE and LEADED ZINC OXIDES
ZINC CARBONATE
GERMANIUM DIOXIDE
AGRICULTURAL LIMESTONE
CRUSHED STONE

Distributors for

American Zinc sales Company

AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, Ohio • Chicago • St. Louis • New York • Detroit • Pittsburgh

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots, 24.40; pigs 22.50, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 26.20; No. 43, 5% Si, 26.00; No. 142, 4% Cu, 1.5% Mg, 2% Ni, 28.20; No. 195, 4.5% Cu, 0.8% Si, 27.60; No. 214, 3.8% Mg, 27.80; No. 356, 7% Si, 0.3% Mg, 26.20.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa., or Elmore, O.

Bismuth: $2.25 per lb ton lots.
Cadmium: Sticks and bars, $1.70 per lb deld.
Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 46.00 deld. Conn. Valley; 46.00 deld. Midwest; custom smelters, 52.00 deld.; Lake, 46.00 deld.; Fire refined, 45.75 deld.

Germanium: First reduction, $201.85-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$110 nom. per troy oz.
Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

Lithium: 99+, cups or ingots, $11.50; rod $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 32.50 f.o.b. Velasco, Tex.; ingot, 33.25 f.o.b. Velasco, Tex.

Magnesium Alloys: AZ91B (diecasting), 31.00 deld.; AZ63A, AZ92A, AZ91C (sand casting), 36.00 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $268-$271 per 76-lb flask.

Molybdenum: Powder, 99% hydrogen reduced, $3.20 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $80-$100, nom. per troy oz.

Palladium: $23-$24 per troy oz.

Platinum: $97-$111 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $13.50-$15.50 per lb.

Silver: Open market, 91.625 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.50-$1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot, 100.875; prompt, 100.75.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $3.45; grade A-2 (0.5% Fe max), $3.15 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.30 per lb, nom., f.o.b. shipping point; less than 1000 lb add 15.00; 99 + % hydrogen reduced, $5.00. Treated ingot, $6.70.
Zinc: Prime Western, 13.50; brass special, 13.75; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.85; special high grade, 15.25 deld. Diecasting alloy ingot No. 3, 18.00; No. 2, 19.00; No. 5, 18.50, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $7.50-$10.00 per lb, depending on quantity; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 30.25-32.75; No. 12 foundry alloy (No. 2 grade), 29.00; 5% silicon alloy, 0.60 Cu max, 30.50-31.25; 13 alloy, 0.60 Cu max, 30.50-31.25; 195 alloy, 30.50-31.25; 108 alloy, 29.00-29.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 29.75-30.25; grade 2, 28.75; grade 3, 28.00; grade 4, 27.50-28.50.

Brass Ingot: Red brass No. 115, 42.00; tin bronze No. 225, 56.00; No. 245, 48.75; high-leaded tin bronze No. 305, 45.75; No. 1 yellow No. 405, 33.25; manganese bronze No. 421, 37.75.

Magnesium Alloy Ingot: AZ63A, 34.00; AZ91B, 34.00; AZ91C, 34.00; AZ92A, 34.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.84; rod, bar, wire, $1.81.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 48 355-51.355; l.c.l., 48.98-51.98. Weatherproof, 30,000-lb lots, 46.03-48.28; l.c.l., 46.78-49.03. Magnetic wire deld., 15 000 lb or more, 55.52-58.68; l.c.l., 56.27-59.43.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $13.10-$13.60; sheared mill plate, $10.50-$12.00; strip, $13.10-$13.60; wire, $9.50-$11.50; forging billets, $7.90-$8.15; hot-rolled and forged bars, $7.90-$8.15.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 23.00-24.00; ribbon zinc in coils, 21.50; plates, 20.00-22.25.

ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	102	83	99
Strip, C.R.	102	92	125
Plate, H.R.	97	87	95
Rod, Shapes, H.R.	87	74	93
Seamless Tubes	122	110	153
Shot, Blocks		71	

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	67.9	66.4		
0.156-0.172	57.5	55.9		
0.188	57.5	55.9		71.7
0.219-0.234	54.5	52.9		
0.250-0.281	54.5	52.9		68.4
0.313	54.5	52.9		65.2
Cold-finished				
0.375-0.547	53.4	51.4	63.7	61.3
0.563-0.688	53.4	51.4	60.6	57.5
0.750-1.000	52.1	50.1	55.4	54.2
1.063	52.1	50.1		52.3
1.125-1.500	50.1	48.2	53.6	52.3
Rolled				
1.563	48.8	46.9		
1.625-2.000	48.2	46.2		50.5
2.125-2.500	47.0	45.0		
2.563-3.375	45.6	43.6		

ALUMINUM

Sheet and Circle: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circles†
0.249-0.136	37.5	42.3		
0.135-0.096	38.0	43.2		
0.095-0.077	38.7	44.2	36.1	41.3
0.076-0.061	39.3	45.1	36.3	41.5
0.060-0.048	39.9	45.6	36.7	42.0
0.047-0.038	40.4	46.5	37.2	42.4
0.037-0.030	40.8	47.0	37.6	43.1
0.029-0.024	41.4	47.5	37.9	43.6
0.023-0.019	42.2	49.0	38.8	44.5
0.018-0.017	43.0		39.4	45.4
0.016-0.015	43.9		40.2	46.6
0.014	44.9		41.2	47.9
0.013-0.012	46.1		41.9	48.9
0.011	47.1		43.1	50.5
0.010-0.0095	48.4		44.3	52.2
0.009-0.0085	49.7		45.8	54.3
0.008-0.0075	51.3		47.0	56.1
0.007	52.8		48.5	58.4
0.006	54.4		49.9	63.4

*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	36.5	40.8
5050-F	37.6	41.9
3004-F	38.6	43.8
5052-F	39.9	45.2
6061-T6	41.1	46.0
2024-T4*	43 6	49.9
7075-T6*	51.4	58.5

*24-48 in. widths or diam, 72-180 lengths.

ALUMINUM

Forging Stock: Round, Class 1, 39.10-50.10 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 43.00-56.20 in random lengths, 0.375-4 in. thick, width 0 750-10 in.
Pipe: ASA Schedule 40, alloy 6063-T6, 20-ft lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
⅜	$16.85	2	$ 51.95
1	26.50	4	143.00
1¼	35.85	6	256.70
1½	42.90	8	386.30

MAGNESIUM

Sheet and Plate: AZ31A standard grade, .032 in., 99.00; .064 in., 78.00; .125 in., 63.50; .250-2.0 in., 61.00. AZ31A special grade, .032 in., 145.00; .064 in., 100.00; .125 in., 83.00; .250-2.0 in., 79.00. Tread plate, .125 in., 68.00; .250-3.0 in., 64.00. Tooling plate, .250-3.0 in., 65.00.

Extrusions	Com. Grade (FS)	Spec. Grade (AZ31B)
1 in. diam. rod	61.50	73.00
Shapes: 0.3 lb/ft	65.40-72.40	76.90-83.90
1.0 lb/ft	61.90-67.30	73 40-78.80
4.0 lb/ft	57.70-62.20	69.20-73.70
2 in. OD x ⅛ in. w. tubing	74.50	86.00

NONFERROUS SCRAP

DEALERS BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings, 20.50-21.00; old sheets, 17.00-17.50; borings and turnings, 11.00-11.50; crankcases, 17.00-17.50; industrial castings, 17.00-17.50.
Copper and Brass: No. 1 heavy copper and wire, 42.00-42.50; No. 2 heavy copper and wire, 38.00-38.50; light copper, 35.50-36.00; No. 1 composition red brass, 31.50-32.00; No. 1 composition turnings, 31.50-32.00; yellow

BRASS MILL PRICES

	MILL PRODUCTS a			SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	64.13b	61.36c	....	64.32	39.000	39.000	38.250
Yellow Brass	53.60	43.80d	54.14	56.51	29.250	29.000	27.125
Low Brass, 80%	57.75	57.69	58.20	60.56	33.000	32.750	32 250
Red Brass, 85%	59.24	59.18	59.78	62.05	34.375	34.125	33.625
Com. Bronze, 90%	61.28	61.22	61.82	63.84	35.750	35.500	35.000
Manganese Bronze	60.84-60.92	54.86-54.96	65.32	....	27.500	27.250	26.750
Muntz Metal	55.14	50.95	....	....	27.375	27.125	26.625
Naval Brass	57.10	51.41	64.16	60.26	27.125	26.875	26.375
Silicon Bronze	67.54	65.73	67.58	69.68e	37.875	37.625	37.875
Nickel Silver, 10%	67.25	69.58g	69.58	....	32.750	32.500	16.375
Phos. Bronze, A, 5%	82.52	83.02	83.02	84.20	39.750	39.500	38.500

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

brass turnings, 17.50-18.00; new brass clippings, 27.50-28.00; light brass, 19.00-19.50; heavy yellow brass, 22.00-22.50; new brass rod ends, 26.00-26.50; auto radiators, unsweated, 24.00-24.50; cocks and faucets, 24.50-25.00; brass pipe, 25.00-25.50.

Lead: Heavy, 12.75-13.00; battery plates, 6.50-6.75; linotype and stereotype, 14.00-14.50; electrotype, 13.25-13.75; mixed babbitt, 15.50.

Magnesium: Clippings, 18.50-19.50; clean castings, 18.00-19.00; iron castings, not over 10% removable Fe, less full deduction for Fe, 16.00-17.00.

Monel: Clippings, 60.00-65.00; old sheets, 55.00-65.00; turnings, 50.00; rods, 59.50-65.00.
Nickel: Sheets and clips, 100.00-150.00; rolled anodes, 100.00-150.00; turnings, 85.00-125.00; rod ends, 100.00-150.00.

Zinc: Old zinc, 6.00-6.50; new die-cast scrap, 6.00; old die-cast scrap, 3.50.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 22.00-22.25; 3003 clippings, 22.00; 6151 clippings, 21.75-22.00; 5052 clippings, 21.75-22.00; 2014 clippings, 21.00-21.75; 2017 clippings, 21.00-21.75; 2024 clippings, 21.00-21.75; mixed clippings, 21.00-21.50; old sheet, 19.50-20.00; old cast, 19.50-20.00, clean old cable (free of steel), 21.75-22.00; borings and turnings, 19.50-20.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 54.00; light scrap, 49.00; turnings and borings, 34.00-39.00.

Copper and Brass: No. 1 heavy copper and wire, 43.00; No. 2 heavy copper and wire, 41.50; light copper, 39.25; refinery brass (60% copper) per dry copper content, 38.50.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 43.00; No. 2 heavy copper and wire, 41.50; light copper, 39.25; No. 1 composition borings, 34.00; No. 1 composition solids, 34.50; heavy yellow brass solids, 24.50; yellow brass turnings, 23.50; radiators, 27.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 60.79; oval, 59.92, 5000-10,000 lb; electrodeposited, 57.75, 2000-5000 lb lots; cast, 59.54, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery, effective Jan. 1, 1955.

Tin: Bar or slab; less than 200 lb, $1.195; 200-499 lb, $1.180; 500-999 lb, $1.175; 1000 lb or more, $1.170.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 28.50; over 10,000 lb, 27.50.

Copper Cyanide: 100 lb, 85.25; 200 lb, 84.50; 300 lb, 84.25; 400-900 lb, 85.50; 1000 lb, 81.50.

Copper Sulphate: 500-1900 lb, 17.90; 2000-5900 lb, 15.90; 6000 lb or more, 15.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 39.50; 10,000 lb and over, 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 3300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.25. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: (Cents per ounce) 4-oz bottle, 86.875; 16-oz bottle, 85.625; 80-oz bottle, 83.125; 100-oz bottle, 83.125; f.o.b. St. Louis, New York and Los Angeles. Effective Sept. 30, 1955.

Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb, and over, 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb, 71.90; 100-600 lb, 63.40; 700-1900 lb, 60.90; 2000-9900 lb, 59.20; 10,000 lb or more, 58.00.

Stannous Chloride (anhydrous): Less than 25 lb, $1.690; 25 lb, $1.340; 100 lb, $1.190; 400 lb, $1.165; 5200-19,600 lb, $1.043; 20,000 lb or more, 92.10.

Stannous Sulphate: Less than 50 lb, $1.316; 50 lb, $1.016; 100-1900 lb, 99.60; 2000 lb or more, 97.60.

Zinc Cyanide: Under 1000 lb, 54.30; 1000 lb and over, 52.30.

Whether your trouble is temper, fatigue resistance, or any other metal ailment, it's smart to call on specialists in the field. Riverside metallurgists are specialists. Their sole job is to help you with any non-ferrous alloy problem.

THE RIVERSIDE METAL COMPANY DIVISION
H. K. PORTER COMPANY, INC.
Riverside, New Jersey
Philadelphia • East Orange, N. J. • Rochester, N. Y.
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RIVERSIDE HKP

PHOSPHOR BRONZE AND NICKEL SILVER SHEET, STRIP, WIRE AND ROD

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 161; to footnotes, page 163.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 .....$65.50

INGOTS, Alloy (NT)

Detroit R7 .....$69.00
Houston S5 .....74.00
Midland,Pa. C18 .....69.00
Munhall,Pa. U5 .....69.00

BILLETS, BLOOMS & SLABS

Carbon, Rerolling (NT)

Aliquippa,Pa. J5 .....$68.50
Bessemer,Pa. U5 .....68.50
Bridgeport,Conn. N19 ..73.50
Buffalo R2 .....68.50
Clairton,Pa. U5 .....68.50
Ensley,Ala. T2 .....68.50
Fairfield,Ala. T2 .....68.50
Fontana,Calif. K1 .....76.00
Gary,Ind. U5 .....68.50
Johnstown,Pa. B2 .....68.50
Lackawanna,N.Y. B2 ..68.50
LoneStar,Tex. L6 .....74.50
Munhall,Pa. U5 .....68.50
Pittsburgh J5 .....68.50
S.Chicago,Ill. R2, U5..68.50
S.Duquesne,Pa. U5 ....68.50
Youngstown R2 .....68.50

Carbon, Forging (NT)

Aliquippa,Pa. J5 ....$84.50
Bessemer,Pa. U5 .....84.50
Bridgeport,Conn. N19 ..89.50
Buffalo R2 .....84.50
Canton,O. R2 .....86.50
Clairton,Pa. U5 .....84.50
Conshohocken,Pa. A3...89.50
Ensley,Ala. T2 .....84.50
Fairfield,Ala. T2 .....84.50
Fontana,Calif. K1 .....92.00
Gary,Ind. U5 .....84.50
Geneva,Utah C11 .....84.50
Houston S5 .....89.50
Johnstown,Pa. B2 .....84.50
Lackawanna,N.Y. B2...84.50
LosAngeles B3 .....94.00
Midland,Pa. C18 .....84.50
Munhall,Pa. U5 .....84.50
Pittsburgh J5 .....84.50
Seattle B3 .....98.00
S.Chicago R2,U5,W14 ..84.50
S.Duquesne,Pa. U5 ....84.50
S.SanFrancisco B3 ....94.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ....$96.00
Buffalo R2 .....96.00
Canton,O. R2, T7 .....96.00
Conshohocken,Pa. A3..103.00
Detroit R7 .....96.00
Fontana,Calif. K1 ....115.00
Gary,Ind. U5 .....96.00
Houston S5 .....101.00
Ind.Harbor,Ind. Y1 ....96.00
Johnstown,Pa. B2 .....96.00
Lackawanna,N.Y. B2 ..96.00
LosAngeles B3 .....116.00
Massillon,O. R2 .....96.00
Midland,Pa. C18 .....96.00
Munhall,Pa. U5 .....96.00
S.Chicago R2,U5,W14..96.00
S.Duquesne,Pa. U5 ....96.00
Struthers,O. Y1 .....96.00
Warren,O. C17 .....96.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$103.50
Canton,O. R2 .....103.50
Cleveland R2 .....103.50
Gary,Ind. U5 .....103.50
S.Chicago R2, W14 ..103.50
S.Duquesne,Pa. U5 ...103.50

SKELP

Aliquippa,Pa. J5 .....4.325
LoneStar,Tex. L6 .....4.625
Munhall,Pa. U5 .....4.225
SparrowsPoint,Md. B2..4.225
Warren,O. R2 .....4.225
Youngstown R2, U5 ...4.225

WIRE RODS

AlabamaCity,Ala. R2 ..5.375
Aliquippa,Pa. J5 .....5.375
Alton,Ill. L1 .....5.55
Buffalo W12 .....5.375
Cleveland A7 .....5.375
Donora,Pa. A7 .....5.375
Fairfield,Ala. T2 .....5.375
Houston S5 .....5.625
IndianaHarbor,Ind. Y1..5.375
Johnstown,Pa. B2 .....5.375
Joliet,Ill. A7 .....5.375
KansasCity,Mo. S5 ....5.625
Kokomo,Ind. C16 .....5.475
LosAngeles B3 .....6.175
Minnequa,Colo. C10 ...5.625
Monessen,Pa. P7 .....5.375
N.Tonawanda,N.Y. B11 5.375
Pittsburg,Calif. C11 ...5.675
Portsmouth,O. P12 ....5.375
Roebling,N.J. R5 .....5.475
S.Chicago,Ill. R2 .....5.375
SparrowsPoint,Md. B2..5.475
Sterling,Ill.(1) N15 ....5.375
Sterling,Ill. N15 .....5.475
Struthers,O. Y1 .....5.375
Worcester,Mass. A7 ...5.675

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 .....4.60
Aliquippa,Pa. J5 .....4.60
Bessemer,Ala. T2 .....4.60
Bethlehem,Pa. B2 .....4.65
Birmingham C15 .....5.10
Clairton,Pa. U5 .....4.60
Fairfield,Ala. T2 .....4.60
Fontana,Calif. K1 .....5.25
Gary,Ind. U5 .....4.60
Geneva,Utah C11 .....4.60
Houston S5 .....4.70
Ind.Harbor,Ind. I-2 ....4.60
Johnstown,Pa. B2 .....4.65
KansasCity,Mo. S5 ....4.70
Lackawanna,N.Y. B2 ..4.65
LosAngeles B3 .....5.30
Minnequa,Colo. C10 ....4.90
Munhall,Pa. U5 .....4.60
Niles,Calif. P1 .....5.25
Portland,Oreg. O4 .....5.35
Phoenixville,Pa. P4 ....5.15
Seattle B3 .....5.35
S.Chicago U5, W14 ....4.60
S.SanFrancisco B3 ....5.25
Torrance,Calif. C11 ....5.30
Weirton,W.Va. W6 ....4.60

Wide Flange

Bethlehem,Pa. B2 .....4.65
Clairton,Pa. U5 .....4.60
Fontana,Calif. K1 .....5.40
Lackawanna,N.Y. B2 ..4.65
Munhall,Pa. U5 .....4.60
Phoenixville,Pa. P4 ....5.15
S.Chicago,Ill. U5 .....4.60

Alloy Std. Shapes

Clairton,Pa. U5 .....5.65
Fontana,Calif. K1 .....7.30
Gary,Ind. U5 .....5.65
Houston S5 .....5.75
Munhall,Pa. U5 .....5.65
S.Chicago,Ill. U5 .....5.65

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 .....6.75
Bessemer,Ala. T2 .....6.75
Bethlehem,Pa. B2 .....6.80
Clairton,Pa. U5 .....6.75
Fairfield,Ala. T2 .....6.75
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.75
Geneva,Utah C11 .....6.75
Houston S5 .....6.85
Ind.Harbor,Ind. I-2, Y1..6.75
Johnstown,Pa. B2 .....6.80
KansasCity,Mo. S5 ....6.85
Lackawanna,N.Y. B2 ..6.80
LosAngeles B3 .....7.45
Munhall,Pa. U5 .....6.75
Seattle B3 .....7.50
S.Chicago,Ill. U5, W14..6.75
S.SanFrancisco B3 .....7.40
Struthers,O. Y1 .....6.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 .....6.80
Lackawanna,N.Y. B2 ..6.80
Munhall,Pa. U5 .....6.75
S.Chicago,Ill. U5 .....6.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....4.65
Lackawanna,N.Y. B2 ..4.65
Munhall,Pa. U5 .....4.60
S.Chicago,Ill. U5 .....4.60

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....5.45
Lackawanna,N.Y. B2 ...5.45
Munhall,Pa. U5 .....5.45
S.Chicago,Ill. U5 .....5.45

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 .....4.50
Aliquippa,Pa. J5 .....4.50
Ashland,Ky.(15) A10 ...4.50
Bessemer,Ala. T2 .....4.50
Bridgeport,Conn. N19 ..4.75
Buffalo R2 .....4.50
Clairton,Pa. U5 .....4.50
Claymont,Del. C22 .....4.80
Cleveland J5, R2 .....4.60
Coatesville,Pa. L7 .....4.80
Conshohocken,Pa. A3 ...4.50
Detroit M1 .....4.60
Ecorse,Mich. G5 .....4.60
Fairfield,Ala. T2 .....4.50
Fontana,Calif.(30) K1 ..5.15
Gary,Ind. U5 .....4.50
Geneva,Utah C11 .....4.50
GraniteCity,Ill. G4 .....4.70
Harrisburg,Pa. P4 .....5.10
Houston S5 .....4.60
Ind.Harbor,Ind. I-2, Y1..4.50
Johnstown,Pa. B2 .....4.50
Lackawanna,N.Y. B2 ...4.50
LoneStar,Tex. L6 .....4.85
Mansfield,O. E6 .....4.50
Minnequa,Colo. C10 ....5.35
Munhall,Pa. U5 .....4.50
Newport,Ky. N9 .....4.50
Pittsburgh J5 .....4.50
Riverdale,Ill. A1 .....4.725
Seattle B3 .....5.40
Sharon,Pa. S3 .....4.50
S.Chicago R2, U5, W14..4.50
SparrowsPoint,Md. B2 ..4.50
Steubenville,O. W10 ....4.50
Warren,O. R2 .....4.50
Weirton,W.Va. W6 .....4.50
Youngstown R2, U5, Y1..4.50

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 .....5.65
Fontana,Calif. K1 .....6.30
Geneva,Utah C11 .....5.65
Johnstown,Pa. B2 .....5.65
SparrowsPoint,Md. B2 ..5.65

PLATES, Wrought Iron

Economy,Pa. B14 .....10.40

PLATES, High-Strength Low-Alloy

Aliquippa,Pa. J5 .....6.725
Bessemer,Ala. T2 .....6.725
Clairton,Pa. U5 .....6.725
Cleveland J5, R2 .....6.725
Claymont,Del. C22 .....6.725
Coatesville,Pa. L7 .....7.025
Conshohocken,Pa. A3 ..6.725
Ecorse,Mich. G5 .....6.825
Fairfield,Ala. T2 .....6.725
Fontana,Calif.(30) K1..7.375
Gary,Ind. U5 .....6.725
Geneva,Utah C11 .....6.725
Houston S5 .....6.825
Ind.Harbor,Ind. I-2, Y1.6.725
Johnstown,Pa. B2 .....6.725
Munhall,Pa. U5 .....6.725
Pittsburgh J5 .....6.725
Seattle B3 .....7.625
Sharon,Pa. S3 .....6.725
S.Chicago,Ill. U5, W14..6.725
SparrowsPoint,Md. B2..6.725
Youngstown U5, Y1 ...6.725

PLATES, Alloy

Bridgeport,Conn. N19 ...6.55
Claymont,Del. C22 .....6.30
Coatesville,Pa. L7 .....6.30
Fontana,Calif. K1 .....6.95
Gary,Ind. U5 .....6.30
Houston S5 .....6.40
Ind.Harbor,Ind. Y1 ....6.30
Johnstown,Pa. B2 .....6.30
Munhall,Pa. U5 .....6.30
Newport,Ky. N9 .....6.30
Seattle B3 .....7.20
Sharon,Pa. S3 .....6.30
S.Chicago,Ill. U5, W14..6.30
SparrowsPoint,Md. B2 ..6.30
Youngstown Y1 .....6.30

FLOOR PLATES

Cleveland J5 .....5.575
Conshohocken,Pa. A3 ..5.575
Harrisburg,Pa. P4 ....5.575
Ind.Harbor,Ind. I-2 ...5.575
Munhall,Pa. U5 .....5.575
S.Chicago,Ill. U5 .....5.575

PLATES, Ingot Iron

Ashland c.l. (15) A10...4.75
Ashland l.c.l. (15) A10..5.25
Cleveland c.l. R2 .....5.10
Warren,O. c.l. R2 .....5.10

BARS

BARS, Hot-Rolled Carbon

Ala.City,Ala.(9) R2 ....4.65
Aliquippa,Pa.(9) J5 ....4.65
Alton,Ill. L1 .....4.85
Atlanta A11 .....4.85
Bessemer,Ala.(9) T2 ...4.65
Birmingham C15 .....5.15
Bridgeport,Conn. N19 ..4.80
Buffalo(9) R2 .....4.65
Canton,O.(9) R2 .....4.75
Clairton,Pa.(9) U5 ....4.65
Cleveland(9) R2 .....4.65
Ecorse,Mich. G5 .....4.75
Emeryville,Calif. J7 ....5.40
Fairfield,Ala.(9) T2 ....4.65
FairlessHills,Pa.(9) U5..4.80
Fontana,Calif. K1 .....5.35
Gary,Ind.(9) U5 .....4.65
Houston(9) S5 .....4.90
Ind.Harbor,Ind.(9) I-2..4.65
Ind.Harbor,Ind. Y1 ....4.65
Johnstown,Pa. B2 .....4.65
Joliet,Ill. P22 .....5.15
KansasCity,Mo.(9) S5 ..4.90
Lackawanna,N.Y. B2 ...4.65
LosAngeles B3 .....5.35
Massillon,O.(9) R2 ....4.75
Midland,Pa. C18 .....4.65
Milton,Pa. M18 .....4.80
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 .....5.35
N.T'wanda,N.Y.(9) B11 4.65
Pittsburg,Calif.(9) C11..5.35
Pittsburgh(9) J5 .....4.65
Portland,Oreg. O4 .....5.40
Seattle B3, N14 .....5.40
S.Chicago W14 .....4.65
S.Chicago,Ill.(9) R2, U5 4.65
S.Duquesne,Pa.(9) U5...4.65
S.SanFran.,Calif. B3 ...5.40
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill. N15 .....4.75
Struthers,O. Y1 .....4.65
Torrance,Calif.(9) C11 ..5.35
Warren,O.(9) R2 .....4.65
Weirton,W.Va.(9) W6 ..4.65
Youngstown(9) R2 U5.4.65

BARS, H.R. Leaded Alloy

Warren,O. C17 .....6.325

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .....5.575
Bridgeport,Conn. N19..5.725
Buffalo R2 .....5.575
Canton,O. R2, T7 .....5.575
Clairton,Pa. U5 .....5.575
Detroit R7 .....5.575
Ecorse,Mich. G5 .....5.675
Fontana,Calif. K1 .....6.625
FairlessHills,Pa. U5 ...5.725
Gary,Ind. U5 .....5.575
Houston S5 .....5.825
Ind.Harbor,Ind. I-2, Y1..5.575
Johnstown,Pa. B2 .....5.575
KansasCity,Mo. S5 ....5.825
Lackawanna,N.Y. B2 ..5.575
LosAngeles B3 .....6.625
Massillon,O. R2 .....5.575
Midland,Pa. C18 .....5.575
S.Chicago R2, U5, W14..5.575
S.Duquesne,Pa. U5 ....5.575
Struthers,O. Y1 .....5.575
Warren,O. C17 .....5.575
Youngstown U5 .....5.575

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 .....6.80
Bessemer,Ala. T2 .....6.80
Bethlehem,Pa. B2 .....6.80
Clairton,Pa. U5 .....6.80
Cleveland R2 .....6.80
Ecorse,Mich. G5 .....6.90
Fairfield,Ala. T2 .....6.80
Fontana,Calif. K1 .....7.50
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
Ind.Harb.,Ind. I-2, Y1..6.80
Johnstown,Pa. B2 .....6.80
KansasCity,Mo. S5 ....7.05
Lackawanna,N.Y. B2 ..6.80
LosAngeles B3 .....7.50
Pittsburgh J5 .....6.80
Seattle B3 .....7.55
S.Chicago W14 .....6.80
S.Duquesne,Pa. U5 ....6.80
S.SanFrancisco B3 .....7.55
Struthers,O. Y1 .....6.80
Warren,O. R2 .....6.80
Youngstown U5 .....6.80

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa. B2 .....4.80

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 .....4.65
Atlanta A11 .....4.85
Fontana,Calif. K1 .....5.35
Joliet,Ill. P22 .....5.10
Niles,Calif. P1 .....5.35
Pittsburgh J5 .....4.65
Portland,Oreg. O4 .....5.40
SanFrancisco S7 .....5.05

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5 .....5.65
Gary,Ind. U5 .....5.65
Houston S5 .....5.90
KansasCity,Mo. S5 .....5.90
Youngstown U5 .....5.65

BARS, C.F. Leaded Alloy

Ambridge,Pa. W18 .....8.325
Camden,N.J. P13 .....8.35
Chicago W18 .....8.325
Cleveland C20 .....8.325
Monaca,Pa. S17 .....8.325
Newark,N.J. W18 .....8.50
SpringCity,Pa. K3 .....8.30
Warren,O. C17 .....8.325

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....6.25*
BeaverFalls,Pa. M12,R2 6.25*
Buffalo B5 .....6.30*
Camden,N.J. P13 .....6.70*
Carnegie,Pa. C12 .....6.25*
Chicago W18 .....6.25*
Cleveland A7, C20 ....6.25*
Detroit B5 .....6.45*
Detroit P17, R7 .....6.25*
Donora,Pa. A7 .....6.25*
Elyria O. W8 .....6.25*
FranklinPark,Ill. N5 ...6.25*
Gary,Ind. R2 .....6.25*
GreenBay,Wis. F7 ....6.25*
Hammond,Ind. L2, M13..6.25*
Hartford,Conn. R2 ....6.75*
Harvey,Ill. B5 .....6.25*
LosAngeles(49) S30 ....7.70*
LosAngeles R2 .....7.70*
Mansfield,Mass. B5 ...6.80*
Massillon,O. R2, R8 ...6.25*
Midland,Pa. C18 .....6.25*
Monaca,Pa. S17 .....6.25*
Newark,N.J. W18 .....6.70*
NewCastle,Pa.(17) B4..6.25*
Pittsburgh J5 .....6.25*
Plymouth,Mich. P5 ....6.50*
Putnam,Conn. W18 ....6.80*
Readville,Mass. C14 ...6.80*
S.Chicago,Ill. W14 ....6.25*
SpringCity,Pa. W3 ....6.70*
Struthers,O. Y1 .....6.25*
Waukegan,Ill. A7 .....6.25*
Worcester,Mass. W19 ..6.70*
Youngstown F3, Y1 ...6.25*

*Including 0.35c for special quality.

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19..5.16

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ...7.425
BeaverFalls,Pa. M12,R2 7.425
Bethlehem,Pa. B2 .....7.425
Buffalo B5 .....7.425
Camden,N.J. P13 .....7.60
Canton,O. T7 .....7.425
Carnegie,Pa. C12 .....7.425
Chicago W18 .....7.425
Cleveland A7, C20 .....7.425
Detroit R7 .....7.425
Detroit B5, P17 .....7.625
Donora,Pa. A7 .....7.425
Elyria,O. W8 .....7.425
Gary,Ind. R2 .....7.425
GreenBay,Wis. F7 .....7.425
Hammond,Ind. L2, M13..7.425
Hartford,Conn. R2 ....7.725
Harvey,Ill. B5 .....7.425
Lackawanna,N.Y. B2 ..7.425
LosAngeles S30 .....9.10
Mansfield,Mass. B5 ...7.725
Massillon,O. R2, R8 ...7.425
Midland,Pa. C18 .....7.425
Monaca,Pa. S17 .....7.425
Newark,N.J. W18 .....7.60
Plymouth,Mich. P5 ....7.625
S.Chicago W14 .....7.425
SpringCity,Pa. K3 .....7.60
Struthers,O. Y1 .....7.425
Warren,O. C17 .....7.425
Waukegan,Ill. A7 .....7.425
Worcester,Mass. A7 ...7.725
Youngstown F3, Y1 ...7.425

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 .....4.65
Atlanta A11 .....4.85
Birmingham C15 .....5.15
Buffalo R2 .....4.65
Cleveland R2 .....4.65
Ecorse,Mich. G5 .....4.75
Emeryville,Calif. J7 ...5.40
Fairfield,Ala. T2 .....4.65
FairlessHills,Pa. U5 ...4.80
Fontana,Calif. K1 .....5.35
Ft.Worth,Tex.(42) T4 ..5.10
Gary,Ind. U5 .....4.65
Houston S5 .....4.90

Ind.Harbor,Ind. I-2, Y1.4.65
Johnstown,Pa. B2 .....4.65
Joliet,Ill. P22 .....5.15
KansasCity,Mo. S5 .....4.90
Lackawanna,N.Y. B2 ..4.65
LosAngeles B3 .....5.35
Milton,Pa. M18 .....4.80
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 .....5.35
Pittsburg,Calif. C11 ....5.35
Pittsburgh J5 .....4.65
Portland,Oreg. O4 .....5.40
SandSprings,Okla. S5 ...5.15
Seattle B3, N14 .....5.40
S.Chicago R2 .....4.65
S.Duquesne,Pa. U5 .....4.65
S.SanFrancisco B3 ....5.40
SparrowsPoint,Md. B2 ..4.65
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill N15 .....4.75
Struthers,O. Y1 .....4.65
Torrance,Calif. C11 ....5.35
Youngstown R2, U5, Y1.4.65

BARS, Reinforcing
(Fabricated; to Consumers)

Johnstown,Pa. ¼-1" B2.6.15
KansasCity,Kans. S5 ...6.45
Lackawanna,N.Y. B2 ...6.17
Marion,O. P11 .....6.15
Pittsburgh U8 .....6.17
Seattle B3, N14 .....c.60
SparrowsPt. ¼-1" B2...6.15
Williamsport,Pa. S19 ...6.00

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2..4.65
ChicagoHts.(4) C2, I-2..4.65
Ft.Worth,Tex.(26) T4...5.10
Franklin,Pa.(3) F5 .....4.65
Franklin,Pa.(4) F5 .....4.65
JerseyShore,Pa.(4) J8 ..4.65
Marion,O.(3) P11 .....4.65
Moline,Ill.(3) R2 .....4.80
Tonawanda(3) B12 ....4.65
Tonawanda(4) B12 ....5.15
Williamsport,Pa.(3) S19.4.65

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 11.50
Economy,Pa.(D.R.)B14 14.30
Economy(Staybolt)B14, 14.65
McK.Rks. (S.R.) L5 ...11.50
McK.Rks. (D.R.) L5 ..16.00
McK.Rks.(Staybolt) L5.17.00

SHEETS

SHEETS, Hot-Rolled Steel
(18 Gage and Heavier)

Ala.City,Ala. R2 .....4.325
Allenport,Pa. P7 .....4.325
Ashland,Ky.(8) A10 ..4.325
Cleveland J5, R2 .....4.325
Conshohocken,Pa. A3 ..4.375
Detroit(8) M1 .....4.425
Dravosburg,Pa. U5 ....4.325
Ecorse,Mich. G5 .....4.425
Fairfield,Ala. T2 .....4.325
FairlessHills,Pa. U5 ...4.375
Fontana,Calif. K1 ....5.075
Gary,Ind. U5 .....4.325
Geneva,Utah C11 .....4.425
GraniteCity,Ill. G4 ....4.525
Ind.Harbor,Ind. I-2, Y1 4.325
Lackawanna,N.Y. B2 ..4.325
Mansfield,O. E6 (37) ..4.325
Munhall,Pa. U5 .....4.325
Newport,Ky.(8) N9 ...4.325
Niles,O. M21 .....4.325
Pittsburg,Calif. C11 ...5.025
Pittsburgh J5 .....4.325
Portsmouth,O. P12 ....4.325
Riverdale,Ill. A1 .....4.55
Sharon,Pa. S3 .....4.325
S.Chicago,Ill. W14 ....4.325
SparrowsPoint,Md. B2 .4.325
Steubenville,O. W10 ...4.325
Warren,O. R2 .....4.325
Weirton,W.Va. W6 ....4.325
Youngstown U5, Y1 ...4.325

SHEETS, H.R. (19 Ga. & Lighter)

Ala.City,Ala. R2 .....5.625
Niles,O. M21 .....5.325

SHEETS, H.R. Alloy

Ind.Harbor,Ind. Y1 ....7.20
Youngstown Y1 .....7.20

SHEETS, H.R. (14 Ga. & Heavier)
High-Strength Low-Alloy

Cleveland J5, R2 .....6.375
Conshohocken,Pa. A3 ..6.425
Dravosburg,Pa. U5 ...6.375
Ecorse,Mich. G5 .....6.475
Fairfield,Ala. T2 .....6.375
FairlessHills,Pa. U5 ...6.425
Fontana,Calif. K1 .....7.125
Gary,Ind. U5 .....6.375
Ind.Harbor,Ind. I-2, Y1.6.375
Lackawanna(35) B2 ..6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
Sharon,Pa. S3 .....6.375
S.Chicago,Ill. U5 .....6.375
SparrowsPoint(36) B2..6.375
Warren,O. R2 .....6.375
Weirton,W.Va. W6 ....6.375
Youngstown U5, Y1 ...6.375

SHEETS, Hot-Rolled Ingot Iron
(18 Gage and Heavier)

Ashland,Ky.(8) A10 ...4.575
Ind.Harbor,Ind. I-2....4.575

SHEETS, Cold-Rolled Steel
(Commercial Quality)

Allenport,Pa. P7 .....5.325
Cleveland J5, R2 .....5.325
Conshohocken,Pa. A3 ..5.375
Dravosburg,Pa. U5 ....5.325
Detroit M1 .....5.325
Ecorse,Mich. G5 .....5.425
Fairfield,Ala. T2 .....5.325
FairlessHills,Pa. U5 ..5.375
Follansbee,W.Va. F4 ..5.325
Fontana,Calif. K1 .....6.425
Gary,Ind. U5 .....5.325
GraniteCity,Ill. G4 ....5.525
Ind.Harbor,Ind. I-2, Y1.5.325
Lackawanna,N.Y. B2 ..5.325
Mansfield,O. E6 .....5.325
Middletown,O. A10 ....5.325
Newport, Ky. N9 .....5.325
Pittsburg,Calif. C11 ..6.275
Pittsburgh J5 .....5.325
Portsmouth,O. P12 ....5.325
SparrowsPoint,Md. B2..5.325
Steubenville,O. W10 ...5.325
Warren,O. R2 .....5.325
Weirton,W.Va. W6 ....5.325
Youngstown Y1 .....5.325

SHEETS, Cold-Rolled
High-Strength Low-Alloy

Cleveland J5, R2 .....7.875
Dravosburg,Pa. U5 ...7.875
Ecorse,Mich. G5 .....7.975
FairlessHills,Pa. U5 ...7.925
Fontana,Calif. K1 ....8.975
Gary,Ind. U5 .....7.875
IndianaHarbor,Ind. Y1.7.875
Lackawanna(37) B2 ..7.875
Pittsburgh J5 .....7.875
SparrowsPoint(38) B2..7.875
Warren,O. R2 .....7.875
Weirton,W.Va. W6 ....7.875
Youngstown Y1 .....7.875

SHEETS, Cold-Rolled Ingot Iron

Middletown,O. A10 ....5.825

SHEETS, Culvert (16 Gage)	Cu Alloy	Cu Fe
Ashland,Ky.	A10.6.90	...
Canton,O.	R2 ....6.10	6.55
Dravosburg	U5 ..6.10	...
Fairfield	T2 ....6.10	...
Gary,Ind.	U5 ....6.10	6.35
Ind.Harbor	I-2 ..6.10	6.35
Kokomo,Ind.	C16.6.20	...
MartinsFry.	W10.6.10	...
Newport,Ky.	N9..6.10	6.35
Pitts.,Calif.	C11..6.85	...
SparrowsPt.	B2..6.10	...

SHEETS, Culvert—Pure Iron

Ashland,Ky. A10 .....7.15
Gary,Ind. U5 .....6.35
MartinsFry,O. W10 ....6.35

SHEETS, Galvanized Steel
Hot-Dipped

Ala.City,Ala. R2 .....5.85‡
Ashland,Ky. A10 .....5.85†
Canton,O. R2 .....5.85‡
Dover,O. R1 .....5.85†
Dravosburg,Pa. U5 ...5.85†
Fairfield,Ala. T2 .....5.85†
Gary,Ind. U5 .....5.85*
GraniteCity,Ill. G4 ....6.05
Ind.Harbor,Ind. I-2 ...5.85†
Kokomo,Ind. C16 .....5.95‡
MartinsFerry,O. W10 ..5.85*
Middletown,O. A10 ....5.85†
Newport,Ky. N9 .....5.85‡
Pittsburg,Calif. C11 ..6.60*
SparrowsPt.,Md. B2 ..5.85†
Warren,O. R2 .....5.85†
Weirton,W.Va. W6 ...5.85*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ....6.575

SHEETS, Galvanized
High-Strength Low-Alloy

Dravosburg,Pa. U5 ....8.60
SparrowsPoint(39) B2 ..8.60

SHEETS, Galvannealed Steel

Canton,O. R2 .....6.25
Dravosburg,Pa. U5 ....6.25
Kokomo,Ind. C16 .....6.60
Newport,Ky. N9 .....6.25

SHEETS, Galvanized Ingot Iron
(Hot-dipped Continuous)

Ashland,Ky. A10 .....6.10
Middletown,O. A10 ....6.10

SHEETS, Electrogalvanized

Cleveland(28) R2 .....6.70
Niles,O.(28) R2 .....6.70
Weirton,W.Va. W6 ....6.55

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1).8.50
Butler,Pa. A10 (type 2).8.60

SHEETS, Enameling Iron

Ashland,Ky. A10 .....5.90
Cleveland R2 .....5.90
Dravosburg,Pa. U5 ....5.90
Gary,Ind. U5 .....5.90
GraniteCity,Ill. G4 ....6.10
Ind.Harbor,Ind. I-2 ....5.90
Middletown,O. A10 ....5.90
Niles,O. M21 .....5.90
Youngstown Y1 .....5.90

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ...7.75
Ind.Harbor,Ind. I-2 ....7.75
Yorkville,O. W10 .....7.75

SHEETS, Long Terne Steel
(Commercial Quality)

BeechBottom,W.Va. W10 6.25
Gary,Ind. U5 .....6.25
Mansfield,O. E6 .....6.25
Middletown,O. A10 .....6.25
Niles,O. M21 .....6.25
Weirton,W.Va. W6 ....6.25

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....6.65

Key To Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Div., Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Frets-Moon Tube Co.
F7 Ft.HowardSteel&Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel&Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel&WireCo.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md.Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New Eng. High Carb. Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 PacificStatesSteelCorp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Division H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel&Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel&Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 YoungstownSheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala. (27) R2 ..4.325
Allenport,Pa. P7 .....4.325
Alton,Ill. L1 .....4.50
Ashland,Ky. (8) A10 ..4.325
Atlanta A11 .....4.525
Bessemer,Ala. T2 .....4.325
Birmingham C15 .....4.825
Bridgeport,Conn. N19 ..4.625
Buffalo(27) R2 .....4.325
Conshohocken,Pa. A3 ..4.375
Detroit M1 .....4.425
Ecorse,Mich. G5 .....4.425
Fairfield,Ala. T2 .....4.325
Fontana,Calif. K1 .....5.075
Gary,Ind. U5 .....4.325
Ind.Harbor,Ind. I-2,Y1.4.325
Johnstown,Pa.(25) B2..4.325
Lackaw'na,N.Y.(24) B2 4.325
LosAngeles(25) B3 ....5.075
Milton,Pa. M18 .....4.325
Minnequa,Colo. C10 ...5.425
Pittsburg,Calif. C11 ...5.075
Portsmouth,O. P12 ....4.325
Riverdale,Ill. A1 .....4.55
SanFrancisco S7 .....5.05
Seattle(25) B3 .....5.325
Seattle N14 .....5.40
Sharon,Pa. S3 .....4.325
S.Chicago,Ill. W14 ....4.325
S.SanFrancisco(25) B3.5.075
SparrowsPoint,Md. B2..4.325
Sterling(1) N15 .....4.325
Sterling,Ill. N15 .....4.425
Torrance,Calif. C11 ...5.075
Warren,O. R2 .....4.325
Weirton,W.Va. W6 ....4.325
Youngstown U5 .....4.325

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19 ..7.50
Carnegie,Pa. S18 .....7.20
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....7.20
Ind.Harbor,Ind. Y1 ....7.20
LosAngeles B3 .....8.40
Newport,Ky. N9 .....7.20
Sharon,Pa. S3 .....7.20
S.Chicago W14 .....7.20
Youngstown U5, Y1 ....7.20

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2 .....6.425
Conshohocken,Pa. A3 ..6.425
Ecorse,Mich. G5 .....6.525
Fairfield,Ala. T2 .....6.425
Fontana,Calif. K1 ....7.525
Gary,Ind. U5 .....6.425
Houston S5 .....6.675
Ind.Harbor,Ind. I-2, Y1.6.425
KansasCity,Mo. S5 ....6.675
Lackawanna,N.Y. B2 ..6.425
LosAngeles(25) B3 ....7.175
Seattle(25) B3 .....7.425
Sharon,Pa. S3 .....6.425
S.SanFrancisco(25) B3.7.175
SparrowsPoint,Md. B2..6.425
Warren,O. R2 .....6.425
Weirton,W.Va. W6 ...6.425
Youngstown U5, Y1 ...6.425

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky. (8) A10 ...4.575

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....6.25
Baltimore T6 .....6.25
Boston T6 .....6.80
Buffalo S40 .....6.25
Cleveland A7, J5 .....6.25
Conshohocken,Pa. A3 ..6.30
Dearborn,Mich. D3 .....6.35
Detroit D2, M1, P20....6.35
Dover,O. G6 .....6.25
Ecorse,Mich. G5 .....6.35
Follansbee,W.Va. F4 ...6.25
Fontana,Calif. K1 .....8.00
FranklinPark,Ill. T6 ...6.35
Ind.Harbor,Ind. I-2 ....6.35
Ind.Harbor,Ind. Y1 ....6.25
Indianapolis C8 .....6.40
Lackawanna,N.Y. B2 ...6.25
LosAngeles C1 .....8.30
NewBedford,Mass. R10..6.70
NewBritain(10) S15 ....6.25
NewCastle,Pa. B4, E5..6.25
NewHaven,Conn. A7, D2 6.70
NewKensington,Pa. A6..6.25
Pawtucket,R.I. R3 ....6.90
Pawtucket,R.I. N8 ....6.80
Pittsburgh J5 .....6.25
Riverdale,Ill. A1 .....6.35
Rome,N.Y.(32) R6 ....6.25
Sharon,Pa. S3 .....6.25
SparrowsPt.,Md. B2 ....6.25
Trenton,N.J.(31) R5 ...7.80
Wallingford,Conn. W2 ..6.70
Warren,O. R2, T5 .....6.25
Weirton,W.Va. W6 ....6.25
Worcester,Mass. A7 ....6.80
Youngstown C8, Y1 ....6.25

STRIP, Cold-Rolled Alloy

Boston T6 .....13.80
Carnegie,Pa. S18 .....13.45
Cleveland A7 .....13.45
Dover,O. G6 .....13.45
FranklinPark,Ill. T6 ..13.45
Harrison,N.J. C18 .....13.45
Indianapolis C8 .....13.60
Pawtucket,R.I. N8 ....13.80
Sharon,Pa. S3 .....13.45
Worcester,Mass. A7 ....13.75
Youngstown C8 .....13.45

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7 .....9.10
Dearborn,Mich. D3 ....9.20
Dover,O. G6 .....9.30
Ecorse,Mich. G5 .....9.20
Ind.Harbor,Ind. Y1 ....9.30

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	7.40	9.35	10.90	13.05	15.75
Boston T6	7.65	9.35	10.90	13.05	15.75
Bristol,Conn. W1	...	...	*10.90*	*13.05*	*15.75*
Carnegie,Pa. S18	...	9.05	10.60	12.75	...
Cleveland A7	7.10	9.05	10.60	12.75	15.45
Cleveland C7	...	9.05	10.60	12.75	15.45
Dearborn,Mich. D3	7.20	9.15	10.70	...	...
Detroit D2	7.20	9.15	10.70	12.85	...
Dover,O. G6	7.10	9.05	10.60	12.75	15.45
FranklinPark,Ill. T6	7.20	9.05	10.60	12.75	15.45
Harrison,N.J. C18	...	...	10.90	13.05	15.75
Indianapolis C8	7.25	9.20	10.60	12.75	15.45
NewBritain,Conn.(10) S15	7.10	9.05	10.60	12.75	15.45
NewCastle,Pa. B4, E5	7.10	9.05	10.60	12.75	...
NewHaven,Conn. D2	7.55	9.35	10.90	13.05	...
NewKensington,Pa. A6	7.10	9.05	10.60	...	...
NewYork W3	...	9.35	10.90	13.05	15.75
Pawtucket,R.I. N8	7.65	9.35	10.90	13.05	15.75
Riverdale,Ill. A1	7.20	9.05	10.60	12.75	15.45
Rome,N.Y.(32) R6	7.10	9.05	10.60	12.75	15.45
Sharon,Pa. S3	7.10	9.05	10.60	12.75	15.45
Trenton,N.J. R5	...	9.35	10.90	13.05	15.75
Wallingford,Conn. W2	7.55	9.35	10.90	13.05	15.75
Warren,O. T5	7.10	9.05	10.60	12.75	15.45
Weirton,W.Va. W6	7.10	9.05	10.60	12.75	15.45
Worcester,Mass. A7, T6	7.65	9.35	10.90	13.05	15.75
Youngstown C8	7.10	9.05	10.60	12.75	15.45
Spring Steel (Tempered)					
Bristol,Conn. W1	...	...	*14.80*	*18.15*	...
Buffalo W12	...	...	*14.80*	...	...
FranklinPark,Ill. T6	...	...	*15.30*	*18.65*	*22.50*
Harrison,N.J. C18	...	...	14.40	17.60	21.00
NewYork W3	...	...	*14.80*	*18.15*	*22.00*
Trenton,N.J. R5	...	...	*14.80*	*18.15*	*22.00*
Worcester,Mass. W12	...	...	*14.80*	...	...
Worcester,Mass. A7, T6	...	...	*14.80*	*18.15*	*22.00*
Youngstown C8	...	...	15.00	18.35	22.35

STRIP, Galvanized (Continuous)

Sharon,Pa. S3 .....6.55

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.05
Riverdale,Ill. A1 .....4.90
Sharon,Pa. S3 .....4.75
Youngstown U5 .....4.75

STRIP, Electrogalvanized

Cleveland A7 .....6.25*
Dover,O. G6 .....6.25*
Riverdale,Ill. A1 .....6.35*
Youngstown C8 .....6.25*
Warren,O. T5 .....6.25*
Warren,O. B9 .....6.45*
Weirton,W.Va. W6 ....5.75*
Worcester,Mass. A7 ...6.80*

*Plus galvanizing extras.

SILICON STEEL

H.R. SHEETS(22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	...	9.95	10.95	11.85
Brackenridge,Pa. A4	...	...	9.95	10.95	11.85
Mansfield,O. E6	8.40	9.35	9.95	10.95	11.85
Newport,Ky. N9	8.40	9.35	9.95	10.95	11.85
Niles,O. M21	8.40	9.35	9.95	10.95	...
Vandergrift,Pa. U5	...	9.35	9.95	10.95	11.85
Warren,O. R2	8.40	9.35	9.95	10.95	11.85
Zanesville,O. A10	...	9.35	9.95	10.95	11.85

C.R. COILS & CUT LENGTHS, (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	...	...	10.70	11.70	12.60
GraniteCity,Ill. G4	8.80*	9.80*	10.40*	11.40*	...
IndianaHarbor,Ind. I-2	8.60†	9.60*	10.20*	11.20*	...
Vandergrift,Pa. U5	...	10.10†	10.70†	11.70†	12.60†
Vandergrift,Pa. U5	8.60*	9.60*	10.20*	11.20*	12.10*
Warren,O. R2	8.60†	10.10	10.70	11.70	12.60

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	12.80	13.35	13.85	14.85
Brackenridge,Pa. A4	12.80	...	...	...
Newport,Ky. N9	12.80	...	...	...
Vandergrift,Pa. U5	12.80	13.35	13.85	14.85
Zanesville,O. A10	12.80‡	13.35‡	13.85‡	14.85‡

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	...	15.85	17.45	17.95	18.45	13.55**
Butler,Pa. A10	...	...	17.45	17.95	...	...
Vandergrift,Pa. U5	14.85	15.85	17.45	17.95	...	13.55
Warren,O. R2	...	...	...	...	...	13.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.90	$8.15	$8.55
Dravosburg,Pa. U5	7.90	8.15	8.55
Fairfield,Ala. T2	8.00	8.25	8.65
FairlessHills,Pa. U5	8.00	8.25	8.65
Gary,Ind. U5	7.90	8.15	8.55
GraniteCity,Ill. G4	8.00	8.25	8.65
IndianaHarbor,Ind. I-2, Y1	7.90	8.15	8.55
Niles,O. R2	7.90	8.15	8.55
Pittsburg,Calif. C11	8.65	8.90	9.30
SparrowsPoint,Md. B2	8.00	8.25	8.65
Weirton,W.Va. W6	7.90	8.15	8.55
Yorkville,O. W10	7.90	8.15	8.55

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	6.675	....	....
Niles,O. R2	6.675	6.875	7.075

TINPLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.20	$9.45
Dravosburg,Pa.U5	9.20	9.45
Fairfield,Ala. T2	9.30	9.55
Fairless,Pa. U5	9.30	9.55
Gary,Ind. U5	9.20	9.45
Ind.Har. I-2, Y1	9.20	9.45
Pitts.,Calif. C11	9.95	10.20
Sp.Pt.,Md. B2	9.30	9.55
Weirton,W.Va. W6	9.20	9.45
Yorkville,O. W10	9.20	9.45

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$7.00
Dravosburg,Pa. U5 ....7.00
Fairfield,Ala. T2 .....7.10
FairlessHills,Pa. U5 ....7.10
Gary,Ind. U5 .....7.00
GraniteCity,Ill. G4 ....7.10
Ind.Harbor,Ind. I-2, Y1.7.00
Niles,O. R2 .....7.00
Pittsburg,Calif. C11 ....7.75
SparrowsPoint,Md. B2.. 7.10
Warren,O. R2 .....7.00
Weirton,W.Va. W6 .....7.00
Yorkville,O. W10 .....7.00

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5 ....6.85
Gary,Ind. U5 .....6.85
GraniteCity,Ill. G4 .....6.75
Ind.Harbor,Ind. Y1 ....6.85
Yorkville,O. W10 .....6.85

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5 ....$8.70
Gary,Ind. U5 .....8.70
Yorkville,O. W10 .....8.70

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10 .....$9.15

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5 .....$10.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..6.60
Aliquippa,Pa. J5 .....6.60
Alton,Ill. L1 .....6.775
Atlanta A11 .....6.80
Bartonville,Ill. K4 .....6.35
Buffalo W12 .....6.60
Chicago W13 .....6.60
Cleveland A7 .....6.60
Crawfordsville,Ind. M8..6.70
Donora,Pa. A7 .....6.60
Duluth,Minn. A7 .....6.60
Fairfield,Ala. T2 .....6.60
Fostoria,O.(24) S1 .....6.80
Houston S5 .....6.85
Jacksonville,Fla. M8 ...6.95
Johnstown,Pa. B2 .....6.60
Joliet,Ill. A7 .....6.60
KansasCity,Mo. S5 .....6.85
Kokomo,Ind. C16 .....6.70
LosAngeles B3 .....7.55
Minnequa,Colo. C10 ....6.85
Monessen,Pa. P7 .....6.60
Newark 6-8 ga. I-1 ....6.90
N.Tonawanda B11 .....6.60
Palmer,Mass. W12 ....6.90
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.60
Rankin,Pa. A7 .....6.60
S.Chicago,Ill. R2 .....6.60
S.SanFrancisco C10 ....7.55
SparrowsPoint,Md. B2 ..6.70
Sterling,Ill.(1) N15 ....6.60
Sterling,Ill. N15 .....6.70
Struthers,O. Y1 .....6.60
Waukegan,Ill. A7 .....6.60
Worcester,Mass. A7 ....6.90

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5 .....7.90
Alton,Ill. L1 .....8.075
Bartonville,Ill. K4 .....8.00
Buffalo W12 .....7.90
Cleveland A7 .....7.90
Donora,Pa. A7 .....7.90
Duluth,Minn. A7 .....7.90
Fostoria,O. S1 .....7.95
Johnstown,Pa. B2 .....7.90
LosAngeles B3 .....8.85
Milbury,Mass.(12) N6 ..8.20
Minnequa,Colo. C10 ....8.15
Monessen,Pa. P16 .....7.90
Muncie,Ind. I-7 .....8.10
Palmer,Mass. W12 .....8.20
Pittsburg,Calif. C11 ....8.85
Portsmouth,O. P12 .....7.90
Roebling,N.J. R5 .....8.20
S.Chicago,Ill. R2 .....7.90
S.SanFrancisco C10 ....8.85
SparrowsPt.,Md. B2 ...8.00
Struthers,O. Y1 .....7.90
Trenton,N.J. A7 .....8.20
Waukegan,Ill. A7 .....7.90
Worcester A7,J4,T6,W12.8.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....7.60
Alton,Ill. L1 .....7.775
Buffalo W12 .....7.60
Cleveland A7 .....7.60
Donora,Pa. A7 .....7.60
Duluth,Minn. A7 .....7.60
Johnstown,Pa. B2 .....7.60
KansasCity,Mo. S5 ....7.85
LosAngeles B3 .....8.55
Minnequa,Colo. C10 ...7.775
Monessen,Pa. P16 .....7.60
NewHaven,Conn. A7 ....7.90
Palmer,Mass. W12 .....7.90
Pittsburg,Calif. C11 ....8.55
Portsmouth,O. P12 .....7.60
Roebling,N.J. R5 .....7.90
S.Chicago,Ill. R2 .....7.60
S.SanFrancisco C10 ....8.55
SparrowsPoint,Md. B2 ..7.70
Struthers,O. Y1 .....7.60
Trenton,N.J. A7 .....7.90
Waukegan,Ill. A7 .....7.60
Worcester,Mass. A7 ....7.90

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1 .....12.725
Bartonville,Ill. K4 ....12.65
Buffalo W12 .....12.55
Chicago W13 .....12.55
Cleveland A7 .....12.55
Crawfordsville,Ind. M8.12.65
Fostoria,O. S1 .....12.55
Jacksonville,Fla. M8 ..12.90
Johnstown,Pa. B2 .....12.55
Kokomo,Ind. C16 .....12.55
Minnequa,Colo. C10 ...12.30
Monessen,Pa. P6 .....12.55
Muncie,Ind. I-7 .....12.75
Palmer,Mass. W12 .....12.85
Roebling,N.J. R5 .....12.85
S.SanFrancisco C10 ....12.90
Waukegan,Ill. A7 .....12.55
Worcester,Mass. A7,T6.12.85

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4 ....10.70
Buffalo W12 .....10.70
Johnstown,Pa. B2 .....10.70
Minnequa,Colo. C10 ..10.825
Monessen,Pa. P16 .....10.70
Muncie,Ind. I-7 .....10.90
Pittsburg,Calif. C11 ..11.50
Portsmouth,O. P12 ....10.70
Roebling,N.J. R5 .....11.00
SparrowsPt.,Md. B2 ...10.80
Struthers,O. Y1 .....10.70

ROPE WIRE	(A)
Bartonville,Ill. K4	10.55
Buffalo W12	10.55
Fostoria,O. S1	10.55
Johnstown,Pa. B2	10.55
Monessen,Pa. P16	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass. W12	10.85
Portsmouth,O. P12	10.55
Roebling,N.J. R5	10.85
SparrowsPt. B2	10.65
Struthers,O. Y1	10.55
Worcester,Mass. J4	10.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE
(Continued)

WIRE, Tire Bead

Bartonville,Ill. K4 ....14.15
Monessen,Pa. P16 ....14.20
Roebling,N.J. R5 ....14.35

WIRE, Cold-Rolled Flat

Anderson,Ind. G6 .....9.00
Baltimore T6 .....*9.80*
Buffalo W12 .....9.00
Cleveland A7 .....9.00
Crawfordsville,Ind. M8..9.00
Dover,O. G6 .....9.00
Fostoria,O. S1 .....9.00
FranklinPark,Ill. T6 ..*9.60*
Kokomo,Ind. C16 .....9.00
Massillon,O. R8 .....9.00
Milwaukee C23 .....9.20
Monessen,Pa. P16 .....9.00
Pawtucket,R.I. N8 .....*9.80*
Riverdale,Ill. A1 .....9.10
Rome,N.Y. R6 .....9.00
Trenton,N.J. R5 .....*9.80*
Worcester A7, T6, W12..*9.80*

NAIL, Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	..152
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Chicago,Ill. W13	152
Cleveland A9	157
Crawfordsville,Ind. M8	..154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Galveston,Tex. D7	157
Houston,Tex. S5	157
Jack'ville,Fla.(23) M8	..162
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
KansasCity,Mo. S5	157
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
S.Chicago,Ill. R2	152
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

NAILS, CUT (100 lb keg)

To Dealers (33)	
Conshohocken,Pa. A3	.$9.05
Wheeling,W.Va. W10	..9.05

STAPLES, Polished Stock

To Dealers & Mfrs. (7)	Col.
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Crawfordsville,Ind. M8	..154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Jack'ville,Fla.(23) M8	..162
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

TIE WIRE, Automatic Baler (14½ Ga.) (Per 97 lb Net Box)

Coil No. 3150	
AlabamaCity,Ala. R2	..$9.35
Bartonville,Ill. K4	....9.45
Buffalo W12	.....9.35
Crawfordsville,Ind. M8	..9.45
Donora,Pa. A7	.....9.35
Duluth,Minn. A7	.....9.35
Jacksonville,Fla. M8	....9.88
Johnstown,Pa. B2	.....9.35
Joliet,Ill. A7	.....9.35
Kokomo,Ind. C16	.....9.45
LosAngeles B3	.....10.14
Minnequa,Colo. C10	....9.60
Pittsburg,Calif. C11	....10.13
S.Chicago,Ill. R2	.....9.35
SparrowsPt.,Md. B2	....9.45
Sterling,Ill. N15	.....9.35

Coil No. 6500 Stand.	
AlabamaCity,Ala. R2	..$9.65
Bartonville,Ill. K4	....9.75
Buffalo W12	.....9.65
Crawfordsville,Ind. M8	..9.75
Donora,Pa. A7	.....9.65
Duluth,Minn. A7	.....9.65
Jacksonville,Fla. M8	....10.18
Johnstown,Pa. B3	.....9.65
Joliet,Ill. A7	.....9.65
Kokomo,Ind. C16	.....9.75
LosAngeles B3	.....10.45
Minnequa,Colo. C10	....9.90
Pittsburg,Calif. C11	....10.45
S.Chicago,Ill. R2	.....9.65
SparrowsPt.,Md. B2	....9.75
Sterling,Ill. N15	.....9.65

Coil No. 6500 Interim	
AlabamaCity,Ala. R2	..$9.70
Bartonville,Ill. K4	.....9.80
Buffalo W12	.....9.70
Crawfordsville,Ind. M8	..9.80
Donora,Pa. A7	.....9.70
Duluth,Minn. A7	.....9.70
Jacksonville,Fla. M8	....10.23
Johnstown,Pa. B2	.....9.70
Joliet,Ill. A7	.....9.70
Kokomo,Ind. C16	.....9.80
LosAngeles B3	.....10.50
Minnequa,Colo. C10	....9.95
Pittsburg,Calif. C11	....10.50
S.Chicago,Ill. R2	.....9.70
SparrowsPt.,Md. B2	....9.80
Sterling,Ill. N15	.....9.70

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	..175**
Aliquippa,Pa. J5	.....172‡
Atlanta A11	181
Bartonville,Ill. K4	181
Crawfordsville,Ind. M8	..181
Donora,Pa. A7	.....175†
Duluth,Minn. A7	.....175†
Fairfield,Ala. T2	.....175†
Houston,Tex. S5	.....180**
Jacksonville,Fla. M8	...186
Johnstown,Pa. B2	....179*
Joliet,Ill. A7	.....175†
KansasCity,Mo. S5	....180**
Kokomo,Ind. C16	.....177†
Minnequa,Colo. C10	....180**
Monessen,Pa. P7	.....178††
Pittsburg,Calif. C11	....195†
Rankin,Pa. A7	.....175†
S.Chicago,Ill. R2	.....175**
S.SanFrancisco C10	...195**
SparrowsPoint,Md. B2	..181*
Sterling,Ill.(1) N15	...179††

WOVEN Fence, 9-15 ga.

	Col.
Ala.City,Ala. R2	....162**
Ala.City, 17 ga. R2	...257**
Ala.City, 18 ga. R2	...267**
Aliq'ppa,Pa.9-14½ga J5	165§
Atlanta A11	168
Bartonville,Ill. K4	168
Crawfordsville,Ind. M8	..168
Donora,Pa. A7	.....162†
Duluth,Minn. A7	.....162†
Fairfield,Ala. T2	.....162†
Houston,Tex. S5	.....167**
Jacksonville,Fla. M8	...173
Johnstown,Pa.(43) B2	..166
Joliet,Ill. A7	.....162†
KansasCity,Mo. S5	....167**
Kokomo,Ind. C16	.....164†
Minnequa,Colo. C10	....167**
Monessen,Pa. 9 ga. P17	166††
Pittsburg,Calif. C11	....185†
Rankin,Pa. A7	.....162†
S.Chicago,Ill. R2	.....162**
Sterling,Ill.(1) N15	..166††

WIRE (16 Gage)	An'ld Galv.	Stone Stone
Ala.City R2	...14.50	16.05**
Bartonville K4	..14.50	16.55
Buffalo W12	....14.50	....
Cleveland A7	....14.50	....
Crawf'dsville M8	14.60	16.55
Fostoria,O. S1	..14.60	16.15†
Jacksonville M8	..14.85	16.80
Johnstown B2	..14.50	16.40*
Kokomo C16	...14.60	16.15†
Minnequa C10	..14.75	16.45**
Palmer,MassW12	14.50	16.05*
Pitts.,Calif. C11	14.85	16.40†
S.Chicago R2	..14.50	16.05**
SparrowsPt. B2	14.60	16.50*
Sterling(1) N15	14.50	16.45††
Waukegan A7	..14.50	16.05†
Worcester A7	...14.80	....

WIRE, Merchant Quality (6 to 8 gage)

	An'ld Galv.
Ala.City,Ala. R2	7.40 7.50**
Aliquippa J5	....7.40 7.925§
Atlanta A11	....7.50 8.10
Bartonville(48) K4	7.50 8.10
Buffalo W12	....7.40 8.80†
Cleveland A7	....7.40 ....
Crawfordsville M8	7.50 8.10
Donora,Pa. A7	....7.40 7.80†
Duluth,Minn. A7	..7.40 7.80†
Fairfield T2	....7.40 7.80†
Houston(48) S5	..7.65 8.05**
Jack'ville,Fla. M8	7.75 8.35
Johnstown B2(48)	7.40 7.975*
Joliet,Ill. A7	....7.40 7.80†
Kans.City(48) S5	7.65 8.05**
Kokomo C16	....7.50 7.90†
LosAngeles B3	....8.35 8.925*
Minnequa C10	....7.65 8.05**
Monessen P7(48)	7.40 8.00††
Palmer,Mass. W12	7.70 8.10†
Pitts.,Calif. C11	..8.35 8.75†
Portsmouth,O. P12	7.40 ....
Rankin A7	....7.40 7.80†
S.Chicago R2	....7.40 7.80**
S.SanFran. C10	..8.35 8.75**
Spar'wsPt.B2(48)	7.50 8.075*
Str'ling(1)(48)N15	7.40 8.00††
Struthers,O.(48)Y1	7.40 7.90‡
Worcester,Mass.A7	7.70 ....

*Based on 12.50c zinc; †5c zinc; §10c zinc; ‡Less than 10c zinc; **Subject to zinc equalization extras. ††13c zinc.

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	...173
Atlanta A11	175
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	..175
Donora,Pa. A7	173
Duluth,Minn. A7	173
Fairfield,Ala. T2	173
Jacksonville,Fla. M8	180
Joliet,Ill. A7	173
Houston S5	178
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
S.Chicago R2	173
S.SanFran.,Calif. C10	..197
SparrowsPoint,Md. B2	..175
Sterling,Ill.(1) N15	173

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2, I-2	..157
Duluth,Minn. A7	157
Franklin,Pa. F5	157
Huntington,W.Va. W7	..157
Johnstown,Pa. B2	157
Marion,O. P11	157
Minnequa,Colo. C10	162
Moline,Ill. R2	162
S.Chicago,Ill. R2	157
Tonawanda,N.Y. B12	...157
Williamsport,Pa. S10	160

FASTENERS

(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)

Carriage, Machine Bolts

Full-Size Body (cut thread)
†½" x 6" and smaller 61
Larger than ½" diam. and all diams. longer than 6" 55
Under-Size Body (rolled thread; not nutted):
½" x 6" and smaller. 61

†½" x 4" and smaller and shorter are not nutted.

Carriage, Machine & Lag Bolts, Hot Galvanized:

½" and smaller 42
Larger than ½" diam. and all diams. longer than 6" 32

Lag Bolts

All diams. & 6" and shorter 61
All diams. longer than 6" 55

Plow, Tap & Blank Bolts

½" x 6" and smaller. 61
Larger than ½" diam. and all diams. longer than 6" 55

Ribbed Neck, Carriage, Step, Elevator, Fitting-up and Tire Bolts:

All sizes 61

STOVE BOLTS, SLOTTED (nuts not attached; bulk)

⅛" to ¼" diam. incl., 3" or shorter:
25,000 to 199,999 pieces 61
200,000 or more pieces 64
⅛" to ½" diam. incl., 3" or shorter:
15,000 to 99,999 pieces 61
100,000 or more pieces 64
Longer than 3", any diam.:
5000 to 99,999 pieces. 61
100,000 or more pieces 64

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.
Structural ⅛-in., larger 9.95
7/16-in. under..List less 32%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	21.06	20.42
1¼	13	....	24.94	20.45
1½	13	23.31	27.57	22.61
1¾	13	27.54	32.57	26.71
2	13	30.87	36.51	29.93
2¼	13	34.77	41.12	33.72
2½	12	37.73	44.63	36.60
2¾	12	41.57	49.16	40.31
3	12	45.00	53.22	43.65
3¼	12	47.99	56.76	46.55

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails No. 2	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	4.725	4.625	4.675	5.65
Ensley,Ala. T2	4.725	4.625	....	5.65
Fairfield,Ala. T2	....	....	....	5.65
Gary,Ind. U5	4.725	4.625	4.675	....
Huntington,W.Va. W7	....	....	....	5.65
IndianaHarbor,Ind. I-2	4.725	4.625	4.675	....
Johnstown,Pa. B2	....	....	...(16)	5.65
Lackawanna,N.Y. B2	4.725	4.625	...(16)	5.65
Minnequa,Colo. C10	4.725	4.625	....	6.15
Steelton,Pa. B2	4.725	4.625	....	....
Williamsport,Pa. S19	....	....	....	5.85

TIE PLATES

Fairfield,Ala. T2 ....5.625
Gary,Ind. U5 .....5.625
Ind.Harbor,Ind. I-2 ...5.625
Lackawanna,N.Y. B2..5.625
Minnequa,Colo. C10 ...5.625
Seattle B3 .....5.775
Steelton,Pa. B2 .....5.625
Torrance,Calif. C11 ...5.775

TRACK BOLTS (20) Treated

Cleveland R2 .....12.90
KansasCity,Mo. S5 ....12.90
Lebanon,Pa. B2 .....12.15*
Minnequa,Colo. C10 ...12.15*
Pittsburgh O3, P14 ..12.15*
Seattle B3 .....12.65*

*Untreated

AXLES

Ind.Harbor,Ind. S13 ....7.25
Johnstown,Pa. B2 .....*7.50*

JOINT BARS

Bessemer,Pa. U5 .....5.825
Fairfield,Ala. T2 .....5.825
Ind.Harbor,Ind. I-2 ...5.825
Joliet,Ill. U5 .....5.825
Lackawanna,N.Y. B2 ..5.825
Minnequa,Colo. C10 ...5.825
Steelton,Pa. B2 .....5.825

SCREW SPIKES

Cleveland R2 .....11.90
Pittsburgh O3 .....11.90

STANDARD TRACK SPIKES

Fairfield,Ala. T2 .....7.90
Ind.Harbor,Ind. I-2, Y1.7.90
KansasCity,Mo. S5 ....7.90
Lebanon,Pa. B2 .....7.90
Minnequa,Colo. C10 ....7.90
Pittsburgh J5 .....7.90
Seattle B3 .....8.40
S.Chicago,Ill. R2 .....7.90
Struthers,O. Y1 .....7.90
Youngstown R2 .....7.90

METAL POWDER

(Per ponnd f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

Sponge iron: Cents
98+% Fe, annealed. 9.25
Swedish, c.i.f. Camden, N. J., c.l. in bags. 9.50
Domestic, f.o.b., Johnstown, Pa., Riverton, N.J., Niagara Falls, N.Y., in bags 9.50
Canadian, f.o.b. shipping point 9.50
Electrolytic iron:
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in. 22.00
Annealed, 99.5% Fe. 36.50
Unannealed (99+% Fe) 34.00
Unannealed (99+% Fe) (minus 325 mesh) 57.00
Powder Flakes (minus 16, plus 100 mesh).. 31.00
Carbonyl Iron:
97.9-99.8% size 5 to 10 microns..83.00-148.00
Aluminum:
Atomized, 500 lb, drum frght. allowed
Carlots 34.50
Ton lots 36.50
Antimony, 500 lb lots 32.00*
Brass, 5000-lb lots .....38.25-52.25†
Bronze, 5000-lb lots .....63.75-67.00†
Copper:
Electrolytic 14.25*
Reduced 14.25*
Lead 7.50*
Manganese:
Minus 35 mesh 64.00
Minus 100 mesh 70.00
Minus 200 mesh 75.00
Nickel, unannealed ... $1.00
Nickel-Silver, 5000-lb lots .....59.75-62.50†
Phosphor-Bronze, ¼-ton lots 58.50
Silicon 47.50
Solder 7.00*
Stainless Steel, 302 .. 99.00
Stainless Steel, 316 .. $1.32
Tin 14.50*
Zinc 5000-lb lots 19.25-33.00‡
Tungsten Dollars
Melting grade, 99% 60 to 200 mesh:
1000 lb and over... 4.50
Less than 1000 lb.. 4.65
Chromium, electrolytic 99.8% Cr min. metallic basis 5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago Base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛-in. to less than 1 7/16-in.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25 off for untreated.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Plus 4c per 100 lb.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill and 0.45c for carbon, add 0.40c for alloy and 0.45c H.S.-L.A.
(31) Widths over ⅝-in.; 6.90c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.25c.
(43) 9-14½ Ga.
(48) 6-7 Ga.
(49) 3½-in. and smaller rounds; 7.95c over 3½-in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Ambridge, Pa. N2	6.5	..	10.5	...	13	...	14.5	...	14.5	...	14	...	16.5	...
Lorain, O. N3	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Youngstown Y1	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Sizes—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Alton, Ill. L1	...	...	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Benwood, W. Va. W10	17.5	+13	9	+18.5	+0.75	+28.5	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Butler, Pa. F6	18	+12.5	9.5	+18	1.5	+26	...	...	...	...	...	...	...	...
Etna, Pa. N2	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Fairless Hills, Pa. N3	...	...	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Fontana, Calif. K1	...	...	....	....	....	....	7	+12.25	10	+8.25	12.5	+4.75	15	+3
Ind. Harbor, Ind. Y1	...	...	....	....	....	....	17.5	+1.75	20.5	2.25	23	5.75	25.5	7.5
Lorain, O. N3	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sharon, Pa. S4	18	+12.5	9.5	+18	1.5	+26	...	...	...	...	...	...	...	...
Sharon, Pa. M6	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sparrows Pt., Md. B2	16	+12.5	7.5	+18	+0.5	+25	16.5	+0.75	19.5	3.25	22	6.75	24.5	8
Youngstown R2, Y1	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Wheatland, Pa. W9	18	+12.5	9.5	+18	1.5	+26	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Alton, Ill. L1	25	7.5	25.5	8	27	8.75	27	8.75	....	...	....	...
Benwood, W. Va. W10	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Etna, Pa. N2	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Fairless Hills, Pa. N3	25	7.5	25.5	8	27	8.75	27	8.75	17.5	+1.25	17.5	+1.25
Fontana, Calif. K1	15.5	+2	16	+1.5	17.5	+0.75	17.5	+0.75	8	+10.75	8	+10.75
Ind. Harbor, Ind. Y1	26	8.5	26.5	9	28	9.75	28	9.75	18.5	+0.25	18.5	+0.25
Lorain, O. N3	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Sharon, Pa. M6	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Sparrows Pt., Md. B2	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+0.25
Youngstown R2, Y1	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Wheatland, Pa. W9	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	Seamless Tube Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	18.50	23.00	....	....	31.00	....	....	....	42.25	39.00
202	19.75	25.50	31.00	36.25	33.50	....	36.75	38.75	42.50	42.50
301	19.25	23.75	....	36.75	32.00	36.00	38.00	....	44.25	41.00
302	20.50	26.25	32.00	37.25	34.50	36.25	38.25	40.25	44.50	44.50
302B	20.25	26.50	33.00	37.25	37.75	36.25	38.25	40.25	47.00	47.00
303	....	26.75	34.75	40.00	....	39.00	41.00	....	....	....
304	21.75	27.50	33.75	39.00	37.25	38.25	40.25	43.00	47.25	47.25
304L	....	....	38.75	44.00	42.25	43.25	45.25	48.00	52.25	52.25
305	23.25	30.25	....	39.50	40.25	38.25	40.25	43.50	50.25	50.25
308	23.50	30.50	38.50	44.25	41.25	43.25	45.50	49.75	52.00	52.00
309	31.00	39.75	46.75	53.50	53.50	52.00	54.75	58.25	67.00	67.00
310	37.25	48.00	62.25	72.25	68.50	69.75	73.50	75.25	78.75	78.75
314	....	....	....	....	....	69.75	....	75.25	....	....
316	31.50	40.25	51.25	59.50	58.25	57.75	60.75	64.00	68.25	68.25
316L	....	....	56.25	64.50	63.25	62.75	65.75	69.00	73.25	73.25
317	37.25	48.25	62.75	72.75	73.50	70.75	74.50	77.00	83.75	83.75
321	25.00	32.00	38.25	44.00	44.25	43.00	45.25	49.25	54.25	54.25
18-8CbTa	29.25	38.00	45.75	52.25	53.25	50.75	53.50	58.00	66.50	66.50
403	....	....	28.75	32.75	....	32.25	34.00	36.25	....	....
405	17.50	23.00	26.75	31.00	32.25	30.50	32.00	33.75	42.25	42.25
410	15.00	19.50	25.50	29.50	28.00	29.00	30.50	31.75	36.25	36.25
416	....	....	26.00	30.00	....	29.50	31.00	....	....	....
420	....	30.25	31.00	36.00	37.75	35.50	37.25	40.75	56.00	56.00
430	15.25	19.75	26.00	30.00	28.75	29.50	31.00	32.25	36.75	36.75
430F	....	....	26.50	30.50	....	30.00	31.50	....	....	....
431	....	25.50	33.25	....	....	37.25	39.25	40.75	....	....
446	....	....	35.50	40.50	53.25	40.00	42.00	43.25	63.25	63.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co., Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates—Carbon Base 10%	Plates—Carbon Base 20%	Sheets Carbon Base 20%
302	....	....	30.50
304	30.30	36.05	32.50
304-L	32.30	37.95	....
310	41.30	47.00	....
316	35.50	41.40	47.00
316-L	40.00	46.10	....
316-CB	41.15	48.45	....
321	32.00	37.75	37.25
347	34.40	41.40	48.25
405	25.80	33.35	....
410	25.30	32.85	....
430	25.30	32.85	....
Inconel	49.45	65.45	....
Nickel	41.05	55.65	....
Nickel, Low Carbon	43.25	60.05	....
Monel	42.35	56.35	....
Copper*	....	....	46.00

	Strip, Carbon Base—Cold Rolled 10%	Strip, Carbon Base—Cold Rolled Both Sides
Copper*	30.00	38.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.275	5% Cr Hot Work	0.430-0.460
Extra Carbon	0.330	W-Cr Hot Work	0.450
Special Carbon	0.390	V-Cr Hot Work	0.470
Oil Hardening	0.430	Hi-Carbon-Cr	0.770

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.090
18.25	4.25	1	4.75	...	2.305-2.475
18	4	2	9	...	2.675-2.6775
18	4	2	....	...	1.765
18	4	1	....	...	1.600
13.75	3.75	2	5	...	2.245
13.5	4	3	....	...	1.865
9	3.5	..	....	...	1.180
6	4	2	....	5	1.105
6	4	3	....	6	1.350
1.5	4	1	....	8.5	0.960

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
AlabamaCity,Ala. R2	54.50	55.00‡	....	....
Birmingham R2	54.50	55.00‡	....	....
Birmingham U6	....	55.00‡	59.00	....
Woodward,Ala. W15	54.50	55.00‡	59.00	....
Cincinnati, deld.	....	62.70	....	....
Buffalo District				
Buffalo H1, R2	58.50	59.00	59.50	60.00
Tonawanda,N.Y. W12	58.50	59.00	59.50	60.00
N.Tonawanda, N.Y. T9	....	59.00	59.50	60.00
Boston, deld.	69.15	69.65	70.15	....
Rochester,N.Y. deld.	61.52	62.02	62.52	....
Syracuse,N.Y. deld.	62.62	63.12	63.62	....
Chicago District				
Chicago I-3	58.50	59.00	59.00	59.50
Gary,Ind. U5	58.50	....	59.00	....
S.Chicago R2	58.50	....	59.00	....
S.Chicago,Ill. Y1	58.50	59.00	59.00	59.50
S.Chicago,Ill. U5, W14	58.50	....	59.00	59.50
Milwaukee, deld.	60.67	61.17	61.17	61.17
Muskegon,Mich. deld.	....	65.30	65.30	....
Cleveland District				
Cleveland A7, R2	58.50	59.00	59.00	59.50
Akron,O., deld.	61.25	61.75	61.75	62.25
Lorain,O. N3	58.50	....	....	59.50
Mid-Atlantic District				
Bethlehem,Pa. B2	60.50	61.00	61.50	62.00
NewYork, deld.	....	64.78	65.28	....
Newark, deld.	63.52	64.02	64.52	65.02
Birdsboro,Pa. B10	60.50	61.00	61.50	62.00
Chester,Pa. P14	60.50	61.00	61.50	....
Philadelphia, deld.	62.16	62.66	63.16	....
Steelton,Pa. B2	60.50	61.00	61.50	62.00
Swedeland,Pa. A3	60.50	61.00	61.50	62.00
Philadelphia, deld.	62.16	62.66	63.16	63.66
Troy,N.Y. R2	60.50	61.00	61.50	62.00
Pittsburgh District				
NevilleIsland,Pa. P6	58.50	59.00	59.00	....
Pittsburgh (N&S sides), Aliquippa, deld.	....	60.37	60.37	60.87
McKeesRocks, deld.	....	60.04	60.04	60.54
Lawrenceville,Homestead, Wilmerding, Monaca, deld.	....	60.66	60.66	61.16
Verona,Trafford, deld.	60.69	61.19	61.19	61.69
Brackenridge, deld.	60.95	61.45	61.45	61.95
Bessemer,Pa. U5	58.50	....	59.00	59.50
Clairton,Rankin,S.Duquesne,Pa. U5.	58.50	....	....	....
McKeesport,Pa. N3	58.50	....	....	59.50
Midland,Pa. C18	58.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Hubbard,O. Y1	....	....	59.00	....
Sharpsville,Pa. S6	58.50	....	59.00	59.50
Youngstown Y1	....	....	59.00	59.50
Youngstown U5	58.50	....	....	59.50
Mansfield,O., deld.	63.40	....	63.90	64.40
Duluth I-3	58.50	59.00	59.00	59.50
Erie,Pa. I-3	58.50	59.00	59.00	59.50
Everett,Mass. E1	62.00	62.50	63.00	....
Fontana,Calif. K1	64.50	65.00	....	....
Geneva,Utah C11	58.50	59.00	....	....
GraniteCity,Ill. G4	60.40	60.90	61.40	....
Ironton,Utah C11	58.50	59.00	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	60.50	61.00	61.50	....
Rockwood,Tenn. T3	....	55.00‡	59.00	....
Toledo,O. I-3	58.50	59.00	59.00	59.50
Cincinnati, deld.	64.26	64.76	....	....

*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.
‡Intermediate (Phos. 0.31-0.69%), $56.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.
Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.
Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	$67.50
Buffalo H1	68.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$91.00
Keokuk,Iowa, (Open-hearth & Fdry, freight allowed K2)	95.50
Keokuk, O.H. & Fdry. 12½ lb piglets, 16% Si, frgt allowed K2	98.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$72.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	72.50
Steelton,Pa. B2 (Phos. 0.035% max)	66.50
Philadelphia, deld.	70.05
Troy,N.Y. R2 (Phos. 0.035% max)	66.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max	63.50
Pittsburgh P6 (Intermediate) (Phos. 0.036-0.075% max)	63.50

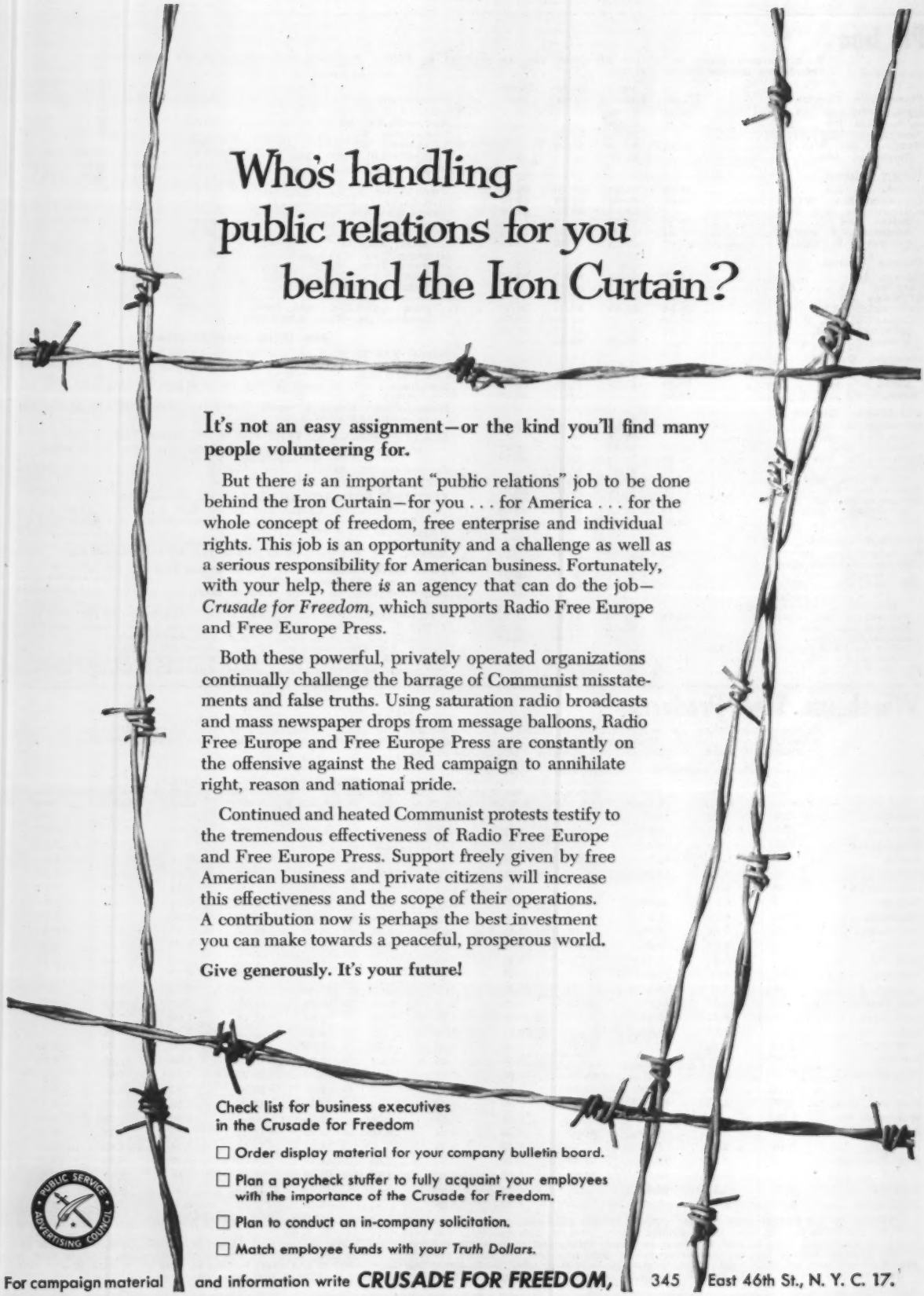
Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: St. Paul, 25 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, 10 cents; Atlanta, Houston, Seattle, Spokane, no charge.

	SHEETS				STRIP	BARS				Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Mer-chant Qual.	H.R. Spec. Qual.	C.F. Rds.‡	H.R. Alloy 4140††		Carbon	Floor
Atlanta	7.14	8.20	8.87	....	7.40	7.42	...	9.39	....	7.63	7.49	9.48
Baltimore	7.21	8.32	8.50	....	7.91	7.53	...	8.62[3]	13.49	7.93	7.21	8.98
Birmingham	7.00	8.24	8.85	....	7.21	7.27	7.80	9.35	....	7.43	7.14	9.34
Boston	7.88	8.81	10.27	45.57	7.96	7.87	8.40	9.67	13.50	8.13	8.20	9.47
Buffalo	7.05	8.25	10.01	....	7.35	7.35	8.20	7.90	13.35	7.60	7.35	8.90
Chattanooga	7.28	8.44	8.60	....	7.36	7.42	7.95	9.18	....	7.43	7.45	9.32
Chicago	7.13	8.24	9.10	49.05	7.21	7.27	7.80	7.75	13.05	7.43	7.45	8.61
Cincinnati	7.12	8.23	9.10	46.10	7.45	7.51	8.04	8.15	13.29	7.90	7.43	8.86
Cleveland	7.13	8.24	8.95	49.16	7.31	7.33	7.86	8.00	13.11	7.76	7.62	8.78
Detroit	7.19	8.43	9.38	43.50	7.49	7.55	8.08	8.04	13.25	7.90	7.42	8.80
Erie, Pa.	7.08	8.24	8.95[10]	....	7.31	7.35	...	8.10[10]	....	7.65	7.30	8.79
Houston	7.85	8.75	10.49	....	8.15	8.25	...	9.85	14.00	8.20	7.80	9.20
Jackson, Miss.	7.44	8.50	9.20	....	7.42	7.57	8.10	9.44	....	7.73	7.75	9.39
Los Angeles	8.50	10.00	11.00	51.50	8.35	8.15	8.70	10.90	14.35	8.30	8.75	10.85
Milwaukee	7.22	8.33	9.19	....	7.30	7.36	7.89	7.94	13.14	7.60	7.54	8.70
Moline, Ill.	7.15	8.44	8.85	....	7.41	7.43	...	8.10	....	7.63	7.34	...
New York	7.61	8.84	9.59	47.57	8.17	8.11	8.66	9.72	13.43	8.09	7.86	9.29
Norfolk, Va.	7.25	...	...	....	7.65	7.65	...	9.50	....	7.95	7.45	8.95
Philadelphia	7.32	8.42	9.37	45.98	7.93	7.68	8.21	8.46	13.21	7.74	7.68	8.80**
Pittsburgh	7.13	8.24	9.40	49.00	7.21	7.27	7.80	8.00	13.05	7.43	7.45	8.61
Portland, Oreg.	7.80	8.80	10.65	....	8.00	7.95	...	12.20	15.00	7.85	7.75	9.60
Richmond, Va.	7.25	...	9.49	....	7.85	7.85	8.38	9.50	....	8.10	7.50	9.35
St. Louis	7.42	8.53	9.69	43.89	7.50	7.56	8.09	8.29	13.34	7.83	7.74	8.90
St. Paul	7.46	8.59	9.16	....	7.72	7.74	...	8.51	13.51	7.94	7.65	9.12
San Francisco	8.10	9.65	10.15	51.65	8.35	8.10	8.65	11.40	14.30[3]	8.20	8.00	10.20
Seattle	8.65	10.40	10.80	54.00	8.90	8.60	9.15	12.10	14.65	8.40	8.40	10.65
Spokane	8.55	11.90[7]	10.80	....	9.05	8.40	8.95	12.10	15.40	8.30	8.20	10.60
Washington	7.59	8.70	7.97	....	8.12	8.08	...	9.09	....	8.51	7.91	9.36

*Prices do not include gage extras; †prices include gage and coating extras (based on 13.50-cent zinc), except in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **⅛-in. and heavier; ††as annealed; ‡‡under ½-in.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [3]—500 to 9999 lb; [5]—400 to 999 lb; [6]—4000 lb and over; [8]—1000 to 1999 lb; [9]—1000 lb and over; [7]—1500 to 3999 lb; [8]—2000 to 3999 lb; [9]—f.o.b. local delivery in lots of 10,000 lb and over; [10]—2000 lb and over.



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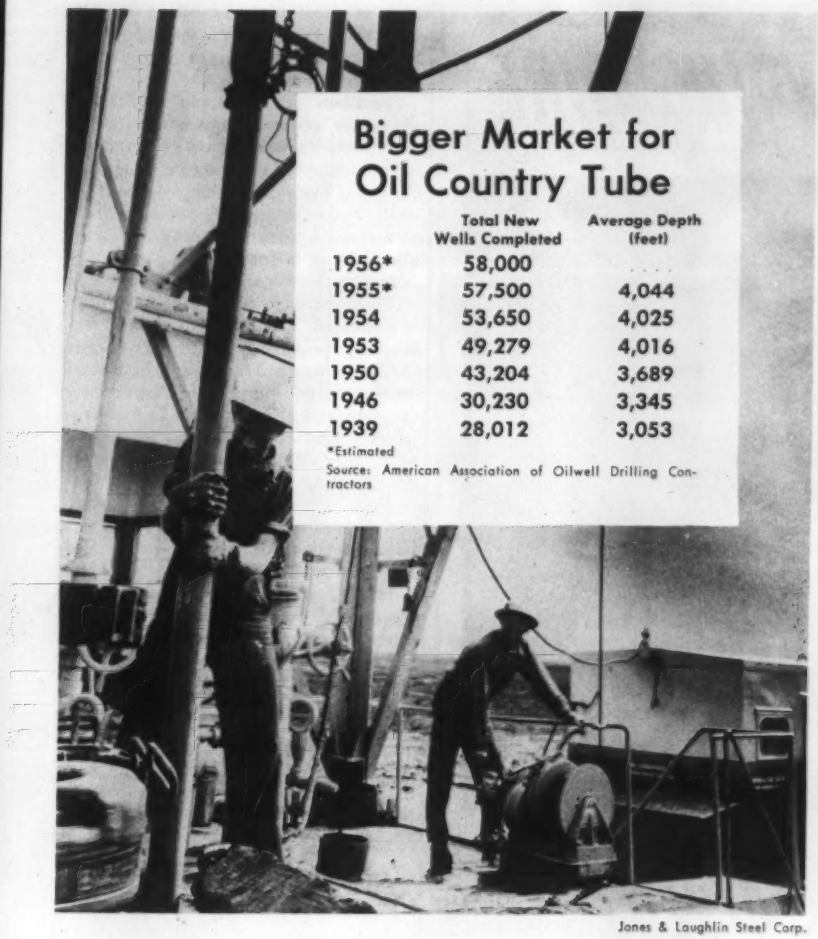


Bigger Market for Oil Country Tube

	Total New Wells Completed	Average Depth (feet)
1956*	58,000	.....
1955*	57,500	4,044
1954	53,650	4,025
1953	49,279	4,016
1950	43,204	3,689
1946	30,230	3,345
1939	28,012	3,053

*Estimated

Source: American Association of Oilwell Drilling Contractors

Jones & Laughlin Steel Corp.

Oil Country Goods Boom

Greater drilling activity and deeper wells mean more sales for tubemakers. Producers are developing better high-strength tube to withstand temperature and pressure

PRODUCERS of oil country goods are counting on increased drilling activity and deeper wells to boost sales in 1956 (see table above). But they are encountering a stern challenge. Their task is to develop stronger, high-alloy tube for wells deeper than any previously drilled.

Richardson & Bass Co., Ft. Worth, Tex., drilled to 22,570 ft early in January in a marsh near Port Sulphur, La. Previous record depth was 21,482 ft, established two years earlier in Kern county, Calif.

Costly Failure—Despite unprecedented pressures, pipe must not fail when drilling costs range as high as $5000 a day. Weight of earth at record well depth in Louisiana is about 20,500 psi. Temperatures as high as 350° F have been recorded. The Louisiana well reached its record depth without a single drill pipe failure. Jones & Laughlin Steel Corp., Pittsburgh, supplied drill pipe, wire rope and casing for that well.

Realizing that drillers will continue to plunge deeper, producers of oil country tubing are revamping their facilities for strengthening tube by physical means. One feature of J&L's $155-million expansion program for 1955 and 1956 is more production facilities for high-strength oil field pipe at its Aliquippa, Pa., works. J&L and others have discovered and perfected methods of tempering alloy steels and quenching and tempering plain carbon steel.

Stimulated Demand—In 1955, National Tube Division of U. S. Steel Corp. began a move to triple the division's production of deep-well casing at McKeesport, Pa. "Greater offshore drilling activity and deeper drillings into high-pressure areas stimulate demand for high-strength casing," explain company officials.

Last year the industry's shipments of high-strength casing amounted to 25 per cent of all casing produced, National Tube reports. Users say future requirements will demand that as much as 40 per cent of all casing be high-strength.

Falling In—Even traditional carbon steel producers are joining the trend. Officials of Pittsburgh Steel Co. say their firm is also increasing tube strength through physical means. Pittsburgh Steel, like others, expects a good sales year. Oil country tube sales managers are taking second-quarter orders now. They expect no sales dip until fourth quarter, when users in Rocky mountain and Canadian areas enter seasonal slowdowns in drilling.

Although sales are strong, there's plenty of competition among tubemakers. Producers are locating oilfield supply stores closer to such active fields as those of Louisiana. National Supply Co., Pittsburgh, opened its ninth store in that state late in January.

Looking Abroad—Tube producers are expanding beyond the borders of the U. S., too. National Supply revamped its export sales organization early this year for better service to rapidly increasing markets in Latin America, the Middle East and the Far East. Arthur W. McKinney, president of National Supply, says a boom market for oil field suppliers is being created by the skyrocketing of drilling and production of oil in foreign countries.

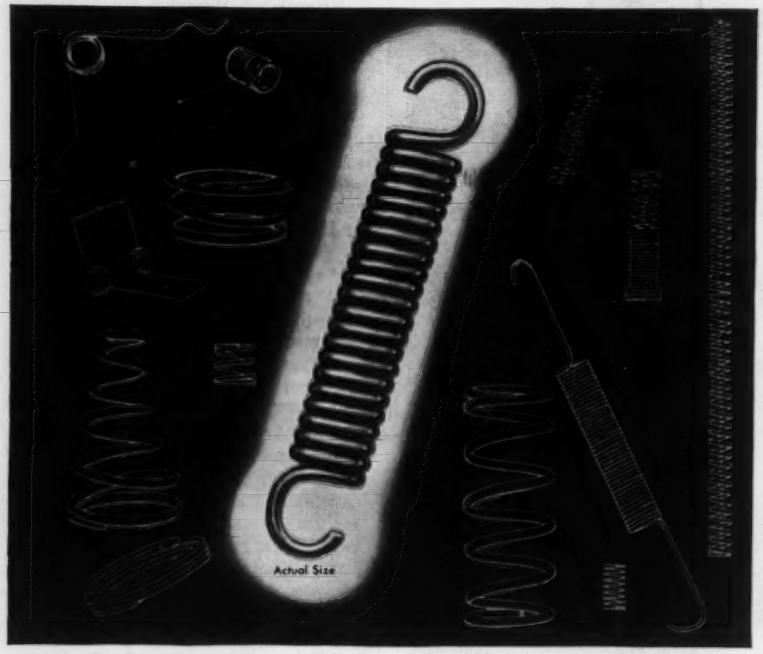
Tubular Goods . . .

Tubular Goods Prices, Page 164

Mill books are so loaded with seamless pipe orders some producers are blanking out April production on 12-in. and over. Buttweld pipe, however, is available for shipment in three to four weeks and merchant pipe jobbers are building up stocks for the expected spring surge in demand.

In New England, the utilities are reported ordering heavier tonnage than usual, deliveries extending into third quarter. Delivery of over 4000

KEYSTONE SPRING WIRE



TOUGH BRAKE SHOE ADJUSTING SPRING

PROBLEM SOLVED!

Wesco Spring Co. of Chicago, Illinois, make springs of many types. But the toughest order in recent years was the brake shoe adjusting spring, shown above. Load and elasticity specs were demanding to provide a vitally important auto part that would permit constant extension without setting. After trying other wires, Wesco consulted their Keystone Wire Specialist and a special, high tensile MB wire was developed for this exacting need. The first shipment of Keystone Wire "hit the nail on the head" and has been specified ever since. Safety-minded automotive engineers—who demand high quality and dependable performance—continue to buy Wesco springs made from Keystone wire, month after month. Just another typical case where Keystone Spring Wire has solved an unusually tough problem.

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Spring Wire problems? Take them to your Keystone Wire Specialist! High carbon steel spring wire—hard drawn, spheroidized annealed, drawn galvanized and copper coated, MB, HB and music wires—are available in Keystone quality to match your spring needs. Wire for Cold Heading and other industrial uses. Your inquiries are invited!

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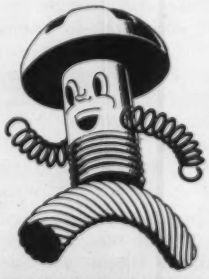

KEYSTONE WIRE for Industry

tons of steel pipe for piling for the Connecticut turnpike, mostly 12 to 16-in., will extend well beyond desired shipment dates.

Seamless tubing stocks of distributors are reported low but buttweld inventories are said to be balanced with turnover fairly active. Mechanical and pressure tubing is moving well. Some easing in pressure from anti-friction bearing producers for alloy tubing is noted.

The outlook for 1956 is promising and an increase in sales and profits is expected, according to A. W. McKinney, president, National Supply Co., Pittsburgh. His view is based on an estimated increase of 4 per cent in domestic consumption of petroleum products this year compared with 1955, and an expected rise in well drilling.

With oil country demand strong for second quarter, order books are being opened for second quarter on standard pipe and specialties at Pittsburgh. While there has been some seasonal letdown in demand for small buttweld pipe, construction needs are expected to rise sharply with the spring revival in building activity.

Export business has increased in several categories of oil country goods and line pipe.

Sharp increase in the movement of cast iron pipe is noted in the Pacific Northwest. Sales agencies in the area anticipate active spring buying.

Wire . . .

Wire Prices, Pages 162 & 163

Cold-rolled carbon flat wire has been increased $10 per ton to 9.80c, f.o.b. mill, by several eastern producers. Advances averaging close to $10 a ton also have been effected on several high carbon wire specialties.

Pressure for spring, heading and certain manufacturers wire grades is easier with some improvement reported in deliveries. There are few automotive order cancellations noted, but deferments of shipments appear more numerous.

April schedules are reported filled on most types of industrial wire, but bookings are somewhat more sluggish. Exceptions are highway accessories and the heavier sizes and grades for reinforcing.

Steel Bars . . .

Bar Prices, Page 160

While some easing in demand for hot-rolled carbon bars is noted, producers are still turning away orders. Generally, the mills anticipate booking all the tonnage they can handle in second quarter. Auto cutbacks haven't had the effect on bars that they have had on sheets. This is because demand for bars is more di-

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versified than that for sheets.

In hot-rolled alloy bars, the supply situation is noticeably easier. Reflecting automotive deferments, some mills have spot openings in schedules, except in the small sizes, ⅞-in. and under. Where spot openings are not available, buyers have little difficulty obtaining tonnage for late March or early April shipment.

This over-all situation applies generally except for nickel-bearing steels, which remain in very tight supply.

Cold-finished alloy bars have not been affected much directly by the auto cutbacks. However, supply is easier due to better hot-rolled supply.

Tin Plate . . .

Tin Plate Prices, Page 162

Tin mills are beginning to ship out material accumulated during the winter, as canmakers build stocks in anticipation of the canning season. This winter, shipments of tin plate maintained a fairly consistent rate.

Users ordered larger amounts than normal this winter as a hedge against a possible price increase Apr. 1. Fear of higher prices is not spurring a rush for March delivery.

Producers are working at capacity, but they are not under extreme pressure for quick delivery. Most mills are several weeks behind schedule in shipments, and a major reason for capacity operations now is to eliminate the backlog of unfilled orders.

Plates . . .

Plate Prices, Page 160

Increases in extras (amounting to approximately 2 per cent) on nickel, monel, inconel and stainless-clad steel plates were effected by Lukens Steel Co. Feb. 15. Base prices are not involved.

Plate demand continues to outrun supply. No early relief seems likely though pressure is off slightly in some other areas of steel production. Plate mills that opened books for the entire second quarter had their production taken up immediately.

Producers are bullish on the outlook for the entire year. Line pipe requirements may taper some, and heavy building construction and miscellaneous tank work may level out. But the platemakers doubt any important consuming classification will get as much tonnage this year as it would like to have.

Not only will railroad equipment requirements greatly exceed those of last year, but further pickup in chemical needs is indicated, as well as a steady rise in shipbuilding requirements and sustained demand for building and heavy industrial equipment.

An increased volume of orders in New England is for defense equipment. Substantial tonnages of nickel clad material are included.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 161 & 162

Sheets sellers are confronted with more demand than they can supply. Tonnages released by deferments and cancellations by automotive interests are being spread among smaller consumers. Automakers are seen returning to the market in heavy volume for April delivery.

Suppliers of hot-rolled sheet would welcome a respite from increasing sales. With some producers not taking orders for first-quarter delivery, remaining producers have not been able to keep pace with demand. Shipments in many instances are a month or more behind schedule.

In opening books for the second quarter, mills in the Philadelphia district found some consumers who did not want all the tonnage offered for April delivery. Some did not wish to commit themselves beyond that month, preferring to await the approach of the May lead time before taking definite action. Despite this evidence of buying caution in the East, mills anticipate no trouble in

LOOK AT THIS UP-TO-THE-MINUTE EXHIBIT OF

POPE PRECISION SPINDLES

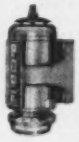
EXHIBIT A

POPE SUPER-PRECISION, HEAVY DUTY BORING SPINDLES for boring holes round within millionths of an inch. Available in both belt driven and motorized units to meet a wide range of speeds and horsepower. Send us your specifications for quotations.

EXHIBIT B

POPE 1 HP, TOTALLY ENCLOSED 3600 RPM MOTORIZED, CARTRIDGE TYPE PRECISION SPINDLES with double row cylindrical roller bearings and separate thrust bearings for no endwise movement of the shaft

EXHIBIT D



POPE HEAVY DUTY, ¾ TO 100 HP DIRECT MOTORIZED SPINDLES for Horizontal or Vertical Skin Milling, Grinding, Milling, Boring and Other Operations

EXHIBIT F

POPE HEAVY DUTY VEE-BELT DRIVEN, PRECISION MILLING SPINDLES, and Wheel Heads, ½ to 50 HP

EXHIBIT G

POPE INTERNAL GRINDING SPINDLES for Bryant, Excello, Heald and Landis Grinders.

EXHIBIT C

NEW POPE QUICK, SELF-REMOVING WHEEL HOLDER for surface grinders and tool and cutter grinders — eliminates the necessity of a wheel puller. Write for quotations.

EXHIBIT E

POPE SUPER-PRECISION MOTORIZED TOOL AND CUTTER GRINDER SPINDLES with clearance Angle Swiveling Heads for *Angular Adjustment In A Vertical Plane*

EXHIBIT H

POPE SUPER-PRECISION HIGH FREQUENCY HEAVY DUTY GRINDING AND MILLING SPINDLES for speeds up to 100,000 RPM

No. 107

WRITE FOR COMPLETE SPECIFICATIONS, PRICE AND DELIVERY

Specify POPE PRECISION SPINDLES

POPE MACHINERY CORPORATION

Established 1920

261 RIVER STREET · HAVERHILL, MASSACHUSETTS

obtaining all the sheet business they can handle in the second quarter.

Tempered spring steel base prices have been advanced. The two extremes: $8 on the 0.8 carbon (maximum) grade and $20 on the 1.05-1.35 carbon (maximum) grade.

Wheeling Steel Corp. is increasing its capacity for electrical sheet production at its Beech Bottom, W. Va., plant. A continuous strand annealing furnace will go into operation in July, permitting Wheeling to enter the growing market for cold-reduced electrical steel in coils. Limited production of grain oriented grades of electrical steel also will be facilitated.

Rails, Cars . . .

Track Material Prices, Page 163

A number of good-sized freight car orders were announced in January, but the trade discounted most as having actually been placed in the closing weeks of 1955 prior to the quick write-off deadline. The light volume of orders that really did develop in January, as recently reported by the American Railway Car Institute and the Association of American Railroads, confirms this trade reaction. New orders in the month fell to 1818 cars, lowest since July, 1954, when only 883 were ordered.

This decline followed an increase in the last seven months of 1955, in which a record high of 51,066 new orders were placed in November, followed by 42,278 in December. In January, 1955, orders totaled 5087 cars.

Deliveries of new cars, however, rose to 4199, compared with 3796 in December and 2008 in January, 1955.

Car order backlogs fell slightly to 144,946 as of Feb. 1, compared with 147,320 on Jan. 1. Backlogs Feb. 1, 1955, were 18,395 cars.

Car orders placed in January comprised 1060 flat cars, 239 covered hopper cars and 519 tank cars. Of the total of 1818, all but 12 went to commercial shops.

Structural Shapes . . .

Structural Shape Prices, Page 160

Structural fabricators are struggling to become more current with their commitments, but they are not having much success because of continued stringency in steel supplies.

Meanwhile, new orders are spotty. There are a number of sizable jobs among current awards, however. Extended deliveries are serving to defer some buying, though few projects are being withdrawn indefinitely.

Heavy equipment shops in the East are taking large contracts for fabricated steel, mostly bridge tonnage. Baldwin-Lima-Hamilton Corp., for instance, booked 12,625 tons for Connecticut bridges. Pusey & Jones, Wilmington, Del., and New York Shipbuilding Co., Camden, N. J., also have large bridge contracts.

This broader distribution of structural work, to some extent, is due to the heavily booked up condition of most fabricators and the extended deliveries offered on new work.

Semifinished Steel . . .

Semifinished Prices, Page 160

Inland Steel Co. broke ground for the three-furnace addition to its No. 3 openhearth at Indiana Harbor, Ind. This is the first project under way in the company's 3-year $260-million expansion program announced last October. The open-hearth extension will require 10,000 tons of structural steel and will take two years for completion. High-strength bolts will be used in construction.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

11,000 tons, superstructure, 23 stringer spans, Bridgeport Harbor bridge, Connecticut turnpike project 311-02, to Baldwin-Lima-Hamilton Corp., Eddystone, Pa., through Terry Contracting Co., New York, bridge contractor.

4500 tons, hangar, American Air Lines, Idle-

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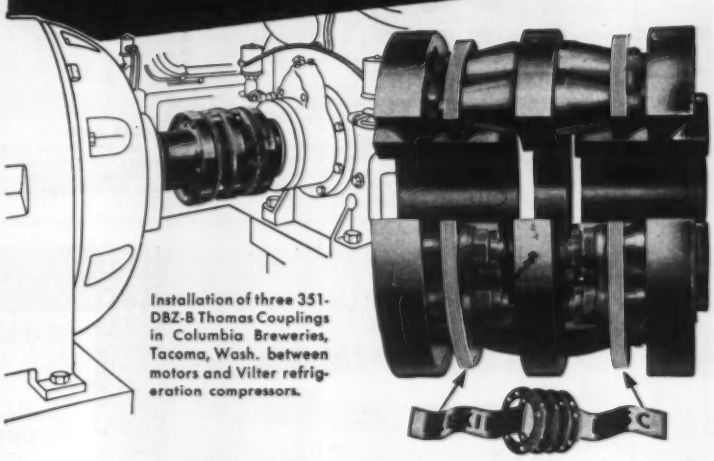
for more years of better service!



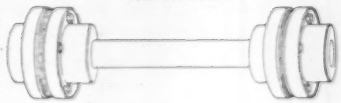
Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



THOMAS

Write for our new Engineering Catalog No. 51A

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Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.

hear about . . .
the new **miller** MULTI ARC *combination ac-dc welders?*

SRAC ac-dc WELDERS . . .

. . . get metallic arc welding jobs done in a superior, time saving way because:

- Operator selects instantly, (1) ac, (2) dc straight polarity or, (3) dc reverse polarity. Here's versatility.
- Patented UNITRAN control circuit eliminates mechanical controls. Here's efficiency.
- No moving parts, plus excellent electrical qualities reduce maintenance and operating costs. Here's savings.

Available in 200, 300, or 400 ampere models with ratings at 60% duty cycle. Power Factor Correction can be supplied.

SRTA ac-dc WELDERS . . .

. . . for BOTH inert gas and metallic arc welding. Instant change from ac to either straight or reverse polarity dc. Power Factor Correction on all models. UNITRAN control circuit removes need for mechanical control and delivers outstanding uniformity throughout welding range. Built in high frequency, combined with balancing resistor, which is in series with transformer secondary, make this the welder for inert gas and metallic welding.

Available in 200 and 300 ampere models, rated at 60% duty cycle.

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MILLER ARCWELD welding electrodes are worthy of the MILLER name and reputation. Ask your distributor for some . . . you'll like the job they do.

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"Know How" gained in over 30 years of service to makers of all kinds of machines and equipment, coupled with up-to-date plant and machinery, is your assurance that Indiana Pressed Steel stampings will solve your stamping problems — and save you money.

As do 2 out of 3 stamping buyers in Indiana, according to a recent confidential survey by a leading metalworking publication.

- Press capacity up to 500 tons
- Stampings up to 20 x 20 inches
- Deep drawn stampings

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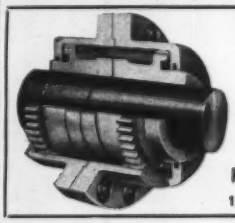

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wild Airport, Long Island, N. Y., to Harris Structural Steel Co., New York.

2100 tons, grade separations and bridges, Connecticut turnpike project 319-01, East Haven-Guilford, Conn., to Harris Structural Steel Co., New York, through M. A. Gammino Construction Co., Providence, R. I., general contractor.

2000 tons, high level bridge, Red River, Grand Ecore, La., to Nashville Bridge Co., Nashville, Tenn.; John F. Beasley Construction Co., Dallas, Tex., general contractor.

1625 tons, two grade separations and five-span bridge over the New Haven railroad, Connecticut turnpike project 302-01, Greenwich, Conn., to Baldwin-Lima-Hamilton Corp., Eddystone, Pa., through Terry Contracting Co., New York.

1220 tons, office and garage, 50 W. 44th St. Corp., 6th Ave. and 44th St., New York, to Bethlehem Steel Co., Bethlehem, Pa.

1170 tons, library, Louisiana State University, Baton Rouge, La., to Ingalls Iron Works, Birmingham; George A. Caldwell, Baton Rouge, general contractor.

850 tons, junior high school No. 61, Queens, New York, to Harris Structural Steel Co., New York.

720 tons, high school, Portsmouth, N. H., to Lyons Iron Works, Manchester, N. H.; Davison Construction Co. Inc., Manchester, general contractor.

625 tons, educational building, IBM Corp., Endicott, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

525 tons, junior and senior high school, Marple and Newton, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, state bridge, Nyssa, Oreg., to unstated interest; general contract to Hansen & Parr, Spokane, Wash., low at $499,227.

445 tons, state highway bridges, Fall River-Boston expressway, Brockton-Avon-Stoughton, Mass., to Bethlehem Steel Co., Bethlehem, Pa., through S. & M. Construction Co., Providence, R. I., general contractor.

430 tons, hangar and shop buildings, Laurence G. Hanscom Airfield, Bedford, Mass., to Groisser & Shlager Iron Works, Somerville, Mass.; S. Volpe & Co., Boston, general contractor; 50 tons, reinforcing bars, Bethlehem Steel Co., Bethlehem, Pa.

240 tons, garage and office, Harrisburg, Pa., through B. & K. Inc., contractor, to Goetz Welding Co., Harrisburg.

220 tons, plant building, Bostitch Inc., East Greenwich, R. I., to Providence Steel & Iron Co., Providence; E. Turgeon Construction Co., Providence, general contractor.

150 tons, junior high school, Quincy, Mass., to L. Antonelli Iron Works Inc., Quincy; James S. Kelleher Co., Quincy, general contractor; 165 tons, joists, Fabricated Steel Products Co., Quincy.

150 tons, stoplogs, frames, etc., Gorge dam, Skagit project, also 40 tons for Kenmore telephone addition, Seattle, to Pacific Car & Foundry Co., Seattle.

125 tons, electronics division plant, Baldwin-Lima-Hamilton Corp., Waltham, Mass., to Groisser & Shlager Iron Works, Somerville, Mass., through Cabot, Cabot & Forbes, Boston.

115 tons, welded girder bridge, Old Lyme, Conn., to Phoenix Bridge Co., Phoenixville, Pa.; Charter Oak Construction Co., Hartford, Conn., general contractor.

100 tons, two school buildings, New Bedford, Mass., to Providence Steel & Iron Co., Providence, R. I.; through Theodore Loranger & Sons, New Bedford, general contractor.

100 tons, underpass, Brunswick, Me., to Bancroft & Martin Rolling Mills Co., South Portland, Me.

STRUCTURAL STEEL PENDING

3540 tons, bridges and retaining wall, Connecticut turnpike proj. 317-04, New Haven, Conn.; bids Mar. 5, Hartford, Conn.; also 1235 tons, concrete reinforcing bars, and 1045 tons, steel piles.

3300 tons, two state hospital building, Kings Park, Long Island, N. Y., Cauldwell-Wingate Co., New York, low on general contract.

3235 tons, multiple span composite girder-beam bridge, West river and Kimberly avenue; multiple span rolled beam viaduct for ramp A and grade separation, Connecticut turnpike proj. 316A-01, West Haven-New Haven; bids Mar. 5, Hartford, Conn.; also

Ores

Lake Superior Iron Ore

(Prices effective for the 1956 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer	$11.25
Old range nonbessemer	11.10
Mesabi bessemer	11.00
Mesabi nonbessemer	10.85
Open-hearth lump	12.10
High phos.	10.85

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for seller's account.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68%	20.00
N. African hematite (spot)	nom. 18.00-20.00
Brazilian iron ore, 68-69% (spot)	26.00-28.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	*$34.00-$34.50*
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, $1.06-$1.11 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, 95c-$1.00.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African

48%	2.8:1	nom. $45.00-$50.00
48%	3:1	42.00-44.00
48%	no ratio	34.00

South African Transvaal

44%	no ratio	$19.00-$20.00
48%	no ratio	33.00-35.00

Domestic

Rail nearest seller

18%	3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.00

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60%	$3.60-$3.85
60-65%	3.85-4.00

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills	
Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles, O., $133.

Super-Duty: Ironton, O., St. Louis, $150

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., Hawstone, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

Super Duty: Hays, Sproul, Hawstone, Pa., Warren, Windham, O., Athens, Tex., $145; Morrisville, Pa., Niles, O., $148; Joliet, Ill., $151; Curtner, Calif., $163.

Semisilica Brick (per 1000)

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Vandalia, Mo., $88.50; Wellsville, O., $92.50; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $194; Danville, Ill., $197; Philadelphia, Clearfield, Pa., $201.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $241; Danville, Ill., $244; Philadelphia, Clearfield, Pa., $248.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $279; Danville, Ill., $281; Clearfield, Pa., Philadelphia, $286.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.50; St. Louis, $169.30.

Nozzles (per 1000)

Reesdale, Pa., $253.70; Johnstown, Pa., $259.20; Clearfield, Pa., $259.40; St. Louis, $259.45; Bridgeburg, Pa., $258.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $196; Clearfield, Pa., $198; St. Louis, $195.80.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $15; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $14.

Magnesite (per net ton)

Domestic, dead-burned, bulk, ⅛-in. grains with fines: Chewelah, Wash., $40; Luning, Nev., $40. ⅜-in. grains with fines: Baltimore, $66.40.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$13.75-14.50
Connellsville, foundry	16.00-17.00

Oven Foundry Coke

Birmingham, ovens	$25.65
Cincinnati, deld.	30.58
Buffalo, ovens	27.50
Buffalo, deld.	28.75
Camden, N. J., ovens	26.50
Chicago, ovens	27.00
Chicago, deld.	28.50
Detroit, ovens	27.50
Detroit, deld.	28.50
Pontiac, deld.	29.06
Saginaw, deld.	30.58
Erie, Pa., ovens	27.50
Everett, Mass., ovens	
New England, deld.	*28.55
Indianapolis, ovens	26.75
Kearny, N. J., ovens	26.75
Lone Star, Tex., ovens	19.50
Milwaukee, ovens	27.50
Neville Island, (Pittsburgh) Pa., ovens	26.25
Painesville, O., ovens	27.50
Cleveland, deld.	29.43
Philadelphia, ovens	26.50
Portsmouth, O., ovens	24.75
Cincinnati, deld.	27.34
St. Paul, ovens	26.50
Swedeland, Pa., ovens	26.50
Terre Haute, Ind., ovens	26.75

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulphate	$42-$45
Birmingham area	42.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-$39; 70%, $35-36; 60%, $31-$32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

Electrodes

Threaded with nipple, unboxed, f.o.b. plant

GRAPHITE

Diam (Inches)	Length (Inches)	Per 100 lb
2	24	$52.50
2½	30	33.75
3	40	32.00
4	40	30.25
5½	40	30.00
6	60	27.25
7	60	26.75
8, 9, 10	60	24.25
12	72	27.25
14	60	23.50
16	72	22.50
17	60	23.00
18	72	22.50
20	72	22.25

CARBON

8	60	12.10
10	60	11.80
12	60	11.75
14	60	11.70
14	72	10.85
17	60	10.75
17	72	10.35
20	84	10.30
20	90	10.10
24	72, 84	10.30
24	96	10.05
30	84	10.20
40, 35	110	9.90
40	100	9.90

830 tons, concrete reinforcing bars, and 2550 tons, steel piles.

1600 tons, five state bridges, Northeast expressway, contract 5, Revere, Mass.; C. J. Maney Co., Lexington, Mass., low, general contract.

540 tons, four state bridges, Northeast expressway, Revere, Mass., contract 4; M. DeMatteo Construction Co., Quincy, Mass., low on general contract; also 250 tons, concrete reinforcing bars.

500 tons, grandstand, Walla Walla, Wash.; bids to commissioners Feb. 21.

300 tons, addition, general hospital, Wilmington, Del.; bids asked.

275 tons, lift-span bridge, York river, York, Me.; bids Mar. 7 at Augusta, Me.

275 tons, state highway bridge, Southeast expressway, Quincy-Braintree, Mass.; Charles Capone Co., Roslindale, Mass., low, general contract.

150 tons, tabernacle, Ocean City, N. J.; readvertised for bids.

125 tons, state highway bridge, Southbridge, Mass.; F. E. Daddario Co., Boston, low general contract.

125 tons, state highway bridge, Northbridge, Mass.; bids in.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1000 to 1500 tons, Boeing Airplane Co., Renton, Wash., plant addition, to Northwest Steel Rolling Mills Inc., Seattle; the Austin Co., Seattle, general contractor.

525 tons, five grade separations, Connecticut turnpike, proj. 315-02, Orange-West Haven, Conn., to U. S. Steel Supply Division, U. S. Steel Corp., New York; John Arborio Inc., Poughkeepsie, N. Y., general contractor.

310 tons, library, Louisiana State University, Baton Rouge, La., to James Fox & Co., Birmingham; George A. Caldwell, Baton Rouge, general contractor.

290 tons, high school, Portsmouth, N. H., to Bancroft & Martin Rolling Mills Co., South Portland, Me.; Davison Construction Co. Inc., Manchester, N. H., general contractor.

205 tons, plant addition, Bostitch Inc., East Greenwich, R. I., to Plantations Steel Co., Providence; E. Turgeon Construction Co., Providence, general contractor.

165 tons, junior high school, Quincy, Mass., to U. S. Steel Supply Division, U. S. Steel Corp., Boston; James S. Kelleher Co., Quincy, general contractor.

160 tons, including joists, two elementary schools, New Bedford, Mass., to Fabricated Steel Products Co., Quincy, Mass.; Theodore Loranger & Sons, New Bedford, general contractor.

125 tons, high level bridge, Red River, Grand Ecore, La., to Mosher Steel Co., Dallas, Tex.; John F. Beasley Construction Co., Dallas, general contractor.

REINFORCING BARS PENDING

2300 tons, Priest Rapids, Columbia river dam project; bids Mar. 12 to Grant County P.U.D., Ephrata, Wash., Mar. 12; project in litigation.

430 tons, dormitories and other buildings, Montana State University, Missoula, Mont.; bids in.

120 tons, Washington state bridge, Thurston county; general contract to T. T. Burnham, Seattle, low at $87,312.

109 tons, highway project, Buckley, Wash.; general contract to Sawyer Construction Co., Tacoma, Wash.

107 tons, undercrossing, Spokane county, Wash.; also 56 tons for Skagit county, Wash., project; bids to Olympia, Wash., Mar. 6.

PLATES . . .

PLATES PLACED

900 tons, steel piling for Ice Harbor dam project to Columbia-Geneva Steel Division, U. S. Steel Corp., Geneva, Utah, by U. S. Engineer; 2000 tons straight web sheet piling awarded same producer for same project at negotiated price of $328,820.

300 tons or more, also shapes, 27 steel barges awarded Western Bridge & Steel Fabricators, Vancouver, B. C., for uranium development, Beaver Lodge area, Athabaska, Can.; to be shipped knocked down to interior.

200 tons or more, also shapes, three steel tugs; $800,000 project to Yarrows Ltd., Victoria, B. C., for shipment to interior.

PIPE . . .

CAST IRON PIPE PLACED

331 tons, various sizes for Portland, Oreg., to U. S. Pipe & Foundry Co., Seattle.

201 tons, for Longview, Wash., to Pacific States Cast Iron Pipe Co., Portland, Oreg.

169 tons, for Clackamas, Oreg., to Pacific States Cast Iron Pipe Co., Portland, Oreg.

100 tons or more, including 62 tons for Centralia, Wash., to U. S. Pipe & Foundry Co., Seattle.

CAST IRON PIPE PENDING

476 tons, 2 to 12-in. mains; bids in at Othello, Wash.

RAILS, CARS . . .

RAILROAD CARS PLACED

Atchison, Topeka & Santa Fe, two business cars, to the Budd Co., Philadelphia.

Baltimore & Ohio, 200 seventy-ton covered hoppers, to Pullman-Standard Car Mfg. Co., Chicago.

Boston & Maine, 50 special flatcars from Piggy-Back Inc., with Pullman-Standard Car Mfg. Co., Chicago, the builder.

Canadian Pacific, 10 rail diesel cars, to the Budd Co., Philadelphia.

Chicago, Rock Island & Pacific, two rail diesel cars, to the Budd Co., Philadelphia.

North American Car Corp., 25 seventy-ton covered hoppers, to Pullman-Standard Car Mfg. Co., Chicago.

Northern Pacific, 14 covered hoppers, to General American Transportation Corp., Chicago.

RAILROAD CARS PENDING

Transportation Supply & Maintenance Command, St. Louis, five 70-ton flatcars, bids Feb. 27.

Versatility counts in HOT DIP GALVANIZING

any size or shape product, any size

order from the smallest to the largest

Excellent facilities for export shipment

ENTERPRISE GALVANIZING COMPANY

2523 E. Cumberland Street Philadelphia 25, Pa.

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famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

THE EASTERN MACHINE SCREW CORP., 22-42 Barclay Street, New Haven, Conn.
Pacific Coast Representative: A. C. Berbringer, Inc., 334 N. San Pedro St., Los Angeles, California. Canada: F. F. Barber Machinery Co., Toronto, Canada.

To Lower your Overhead..

BROWNING ELECTRIC TRAVELING CRANES AND HOISTS up to 125-TON CAPACITY

VICTOR R. BROWNING & CO., INC. WILLOUGHBY (Cleveland), OHIO

IF METALWORKING PLANTS ARE YOUR PROSPECTS . . .

STEEL can put you in touch with the important ones, those that do more than 92% of the industry's business. Tell the buyers and specifiers in these plants of the machines or materials you have for sale through an "Equipment—Materials" advertisement. For rates write STEEL, Penton Building, Cleveland 13, Ohio.

Current Ferroalloy Quotations

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $94; 19-21% Mn, 1-3% Si, $91.50; 16-19% Mn, $89.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $205. Duquesne, Johnstown, Sheridan, Pa.; Philo, O.; Tacoma, Wash.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $213 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 30.95c per lb of contained Mn, carload packed 32c, ton lots 33.5c, less ton 34.7c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 22.35c per lb of contained Mn, packed, carload 23.4c, ton lot 25c, less ton 26.2c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max): Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 30c; 2000 lb to min carload, 32c; 250 lb to 1999 lb, 34c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 11.5c per lb of alloy. Packed, c.l. 12.5c, ton 12.95c, less ton 13.95c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37 f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N.Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 26.25c per lb of contained Cr; c.l. packed 27.5c, ton lot 29.25c, less ton 30.65c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 31.75c per lb contained Cr, 0.02% max 38.50c, 0.03% max 38c, 0.06% max 36.50c, 0.1% max 36c, 0.15% max 35.75c, 0.2% max 35.50c, 0.5% max 35.25c, 1.0% max 34c, 1.5% max 33.85c, 2.0% max 33.75c. Ton lot, add 3.1c, less ton add 4.8c. Carload packed add 1.45c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l. 2 in. x D, bulk 27.4c per lb contained Cr. Packed, c.l. 28.7c, ton 30.5c, less ton 32c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed 8 M x D, 19.6c per lb of alloy, ton lot 20.85c; less ton lot, 22.05c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 39.05c per lb of contained Cr; 1" x down, bulk 39.8c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2 max). Contract, carlot, packed 2" x D plate (about ¼" thick) $1.25 per lb, ton lots $1.27, less ton lots $1.29. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.20. **High Speed Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.30.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots, packed, $1.33 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.75c per lb of contained Si. Packed, c.l. 14.85c, ton lot 16.3c, less ton 17.95c. F.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.2c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 14.5c per pound contained silicon. Packed, c.l. 16.2c, ton lots, 18c; less ton, 19.35c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 15.4c per lb of contained Si. Packed, c.l. 17.05c, ton lot 18.7c, less ton 19.95c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si. Packed, c.l. 19.95c, ton lot 21.35c, less ton 22.4c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min 98% Si, 0.75% max Fe, 0.07 max Ca). C.l. lump, bulk, 20.5c per lb of Si. Packed, c.l. 21.95c, ton lot 23.25c, less ton 24.25c. Add 0.5c for max 0.03 Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lots packed 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 8.5c, per lb of alloy. Packed, c.l. 9.5c, ton lot 10.65c, less ton 11.5c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 26.25c per lb of alloy, ton lot 27.4c, less ton 28.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D. $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 22c per lb of alloy, carload packed 23.05c, ton lot 24.95c, less ton 25.95c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 21.5c per lb or alloy, carload packed 22.95c, ton lot 25.25c, less ton 26.75c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅝ lb each and containing 2 lb of Cr). Contract, carload, bulk, 16.95c per lb of briquet, carload packed in box pallets 17.15c, in bags 17.85c; 3000 lb to c.l. in box pallets 18.35c; 2000 lb to c.l. in bags, 19.05c; less than 2000 lb in bags 19.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing 2 lb of Mn). Contract, carload, bulk 12.5c per lb of briquet, c.l. packed, pallets 12.7c, bags 13.5c; 3000 lb to c.l., pallets 13.9c; 2000 lb to c.l., bags, 14.7c, less ton 15.6c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing 2 lb of Mn and approx. ½ lb or Si). Contract, c.l. bulk 13.15c per lb of briquet, c.l. packed, pallets, 13.35c; bags 14.15c, 3000 lb to c.l., pallets, 14.55c; 2000 lb to c.l., bags, 15.35c; less ton 16.25c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.15c per lb of briquet; packed, pallets, 7.35c; bags, 8.15c; 3000 lb to c.l., pallets, 8.95c; 2000 lb to c.l. bags 9.75c; less ton 10.65c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2½ lb and containing 1 lb of Si). Carload, bulk 7.3c. Packed, pallets 7.5c; bags 8.30c; 3000 lb to c.l. pallets 9.1c; 2000 to c.l. bags 9.9c; less ton 10.8c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.33 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.45 per lb of contained W; 2000 lb W to 5000 lb W, $3.55; less than 2000 lb W, $3.67. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min C 0.30% max). Ton lots, 2" x D, $4.65 per lb of contained Cb plus Ta, delivered; less ton lots $4.70.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, c.l. packed ½ in. x 12 M, 18.5c per lb of alloy, ton lots 19.65c, less ton 20.9c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18.5c per lb of alloy, ton lots 19.65c; less ton lots 20.9c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 17.2c per lb of alloy; ton lots 18.7c; less ton lots 19.95c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 17.50c. Packed c.l. 18.50c, 200 lb to c.l. 19.50c, less than 2000 lb 20c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base; caload, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, Pa., $1.54 in all sizes except powdered which is $1.66; Washington, Pa., furnace, any quantity $1.46.

Technical Molybdic-Oxide: Per lb contained Mo, f.o.b. Langeloth, Pa.; $1.31 in cans; in bags, $1.30, f.o.b. Langeloth, Pa.; $1.24, Washington, Pa.

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Scrap . . .

Scrap Prices, Page 178

Philadelphia—Steel scrap prices are easier. Interest centers on negotiations for March tonnage for the Fairless Works. No. 1 heavy melting, No. 1 bundles and No. 1 busheling are moving in light trading at $50-$51, delivered. No. 2 heavy melting is quoted at $43-$44 and No. 2 bundles at $40-$42.

Contributing to present easiness is a lag in exports. Except for 2000 tons of motor blocks no scrap will leave the port of Philadelphia in February.

Electric furnace bundles are off to $52-$53, machine shop turnings to $36, and heavy turnings to $46-$47. Low phos structurals and plate have dropped to $54-$56. The Fairless Works closed on No. 1 cupola at $50, delivered, and on machinery cast at $54. Drop broken machinery is holding at $54-$55, delivered. Heavy breakable cast is stronger at $53, delivered. All other grades are unchanged.

Boston—Brokers' buying prices are lower, all steel and most cast grades being weaker. New buying is light, including export volume. Unloaded cars are slowing down shipments to dock. No. 1 heavy melting steel is off about $2 per ton, shipping point, and lighter grades of industrial scrap are following the downtrend in the market.

New York—Scrap brokers' prices have dipped sharply. February orders have been largely covered, export demand is easier and major grades are in easy supply. Brokers are offering $41-$42 for No. 1 heavy melting and No. 1 bundles, $37-$38 for No. 2 heavy melting and $32-$33 for No. 2 bundles. Prices also have dropped on machine shop turnings to $24-$25, on mixed borings and turnings to $27-$28 and on short shovel turnings to $29-$30. Low phos structural and plate scrap is off nominally to $45-$46. Cast grades are unchanged.

Cleveland — The scrap market continues quiet with prices unchanged both here and in the Valley. Buying by the steel mills is limited but the foundries, notably those on machine tool castings, are fairly active buyers. Automotive lists are expected to come out next week. Indications are the tonnages will about equal those offered at the end of January.

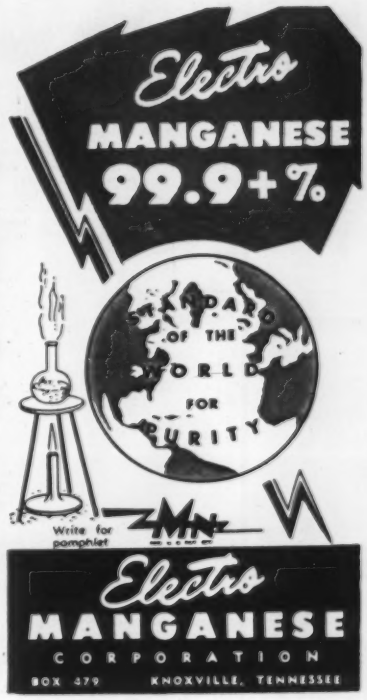
Pittsburgh — The recent purchase of No. 1 heavy melting steel at $48 by an independent mill here is the predominate factor in the local scrap market. An earlier order by another mill for the same grade at $50 has been filled. The $48 order was for a small tonnage and prices, as a result, are somewhat nominal. Demand is weak and prices of cut structurals, punchings and plate scrap continue to decline. There is little activity in the cast grades. The same is true of railroad scrap.

Cincinnati—The scrap market appears weak with demand sluggish. The price trend still appears to be downward.

Chicago—A stable scrap market prevails here with few price changes. These few revisions have been downward and are contrary to the view of some observers that prices might strengthen a bit as a reaction to the recent slide. Buying volume has been light. A mill bought No. 1 factory bundles for $49, delivered, down $2; No. 1 dealer bundles for $46 and railroad heavy melting for $50, both off $1 a ton.

Detroit—The market is dull, largely because it is one week before the new automotive lists are closed. No large buying is reported currently. One of the larger auto companies sold a tonnage (in addition to its usual list) resulting in lower prices on the No. 1 grades.

(*Please turn to page* 180)



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Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Feb. 22	$48.33
Feb. 15	49.00
Jan. Avg.	52.17
Feb. 1955	36.79
Feb. 1951	44.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*47.00-48.00*
No. 2 heavy melting	43.00-44.00
No. 1 bundles	*47.00-48.00*
No. 2 bundles	40.00-41.00
No. 1 busheling	*47.00-48.00*
Machine shop turnings	33.00-34.00
Mixed borings, turnings	33.00-34.00
Short shovel turnings	36.00-37.00
Cast iron borings	36.00-37.00
Cut structurals, 3 ft lengths	*56.00-57.00*
Heavy turnings	44.00-45.00
Punching & plate scrap	*56.00-57.00*
Electric furnace bundles	52.00-53.00

Cast Iron Grades

No. 1 cupola	48.00-49.00
Charging box cast	45.00-46.00
Heavy breakable cast	45.00-46.00
Unstripped motor blocks	32.00-33.00
No. 1 machinery cast	*53.00-54.00*

Railroad Scrap

No. 1 R.R. heavy melt.	53.50-54.50
Rails, 2 ft and under	65.00-66.00
Rails, 18 in. and under	66.00-67.00
Rails, random lengths	61.00-62.00
Railroad specialties	60.00-61.00

Stainless Steel Scrap

18-8 bundles & solids	340.00-350.00
18-8 turnings	235.00-245.00
430 bundles & solids	110.00-120.00
430 turnings	60.00-65.00

CLEVELAND

No. 1 heavy melting	49.00-50.00
No. 2 heavy melting	43.00-44.00
No. 1 bundles	49.00-50.00
No. 2 bundles	38.00-39.00
No. 1 busheling	49.00-50.00
Machine shop turnings	29.00-30.00
Mixed borings, turnings	33.00-34.00
Short shovel turnings	33.00-34.00
Cast iron borings	33.00-34.00
Low phos.	54.00-55.00
Cut structural plates 2 ft and under	54.00-55.00
Alloy free, short shovel turnings	37.00-38.00
Electric furnace bundles	49.50-50.50

Cast Iron Grades

No. 1 cupola	54.00-55.00
Charging box cast	47.00-48.00
Stove plate	*52.00-53.00*
Heavy breakable cast	46.00-47.00
Unstripped motor blocks	36.00-37.00
Brake shoes	41.00-42.00
Clean auto cast	53.00-54.00
Burnt cast	41.00-42.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt.	53.00-54.00
R.R. malleable	59.00-60.00
Rails, 2 ft and under	69.00-70.00
Rails, 18 in. and under	70.00-71.00
Rails, random lengths	65.00-66.00
Cast steel	59.00-60.00
Railroad specialties	59.00-60.00
Uncut tires	60.00-61.00
Angles, splice bars	63.00-64.00
Rails, rerolling	67.00-68.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	340.00-350.00
18-8 turnings	200.00-210.00
430 clips, bundles, solids	105.00-115.00
430 turnings	55.00-65.00

YOUNGSTOWN

No. 1 heavy melting	52.00-53.00
No. 2 heavy melting	44.00-45.00
No. 1 bundles	52.00-53.00
No. 2 bundles	39.00-40.00
No. 1 busheling	52.00-53.00
Machine shop turnings	31.50-32.50
Short shovel turnings	36.00-37.00
Cast iron borings	36.00-37.00
Low phos.	53.00-54.00
Electric furnace bundles	53.00-54.00

Railroad Scrap

No. 1 R.R. heavy melt.	54.00-55.00

CHICAGO

No. 1 heavy melting	46.00-48.00
No. 2 heavy melting	37.00-38.00
No. 1 factory bundles	*48.00-49.00*
No. 1 dealer bundles	*45.00-46.00*
No. 2 bundles	36.00-37.00
No. 1 busheling	46.00-48.00
Machine shop turnings	25.00-26.00
Mixed borings, turnings	27.00-28.00
Short shovel turnings	27.00-28.00
Cast iron borings	27.00-28.00
Cut structurals, 3 ft	52.00-53.00
Punchings & plate scrap	53.00-54.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Stove plate	38.00-39.00
Unstripped motor blocks	36.00-37.00
Clean auto cast	51.00-52.00
Drop broken machinery	51.00-52.00

Railroad Scrap

No. 1 R.R. heavy melt.	*49.00-50.00*
R.R. malleable	*58.00-59.00*
Rails, 2 ft and under	62.00-63.00
Rails, 18 in. and under	63.00-64.00
Angles, splice bars	60.00-61.00
Rails, rerolling	*66.00-67.00*

Stainless Steel Scrap

18-8 bundles & solids	*325.00-340.00*
18-8 turnings	*230.00-240.00*
430 bundles & solids	*105.00-110.00*
430 turnings	*45.00-50.00*

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*45.00*
No. 2 heavy melting	32.00
No. 1 bundles	*45.00*
No. 2 bundles	33.00
No. 1 busheling	*45.00*
Machine shop turnings	22.00
Mixed borings, turnings	22.00
Short shovel turnings	25.00
Punching & plate scrap	*54.00*

Cast Iron Grades

No. 1 cupola	43.00
Charging box cast	37.00
Stove plate	37.00
Heavy breakable	35.00
Unstripped motor blocks	25.00
Clean auto cast	46.00
Malleable	42.00

BIRMINGHAM

No. 1 heavy melting	41.00-42.00
No. 2 heavy melting	*38.00-39.00*
No. 1 bundles	41.00-42.00
No. 2 bundles	*29.00-30.00*
No. 1 busheling	41.00-42.00
Cast iron borings	19.00-20.00
Short shovel turnings	30.00-31.00
Machine shop turnings	29.00-30.00
Electric furnace bundles	*44.00-45.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.50-48.00
Stove plate	44.50-45.50
Bar crops and plate	51.00-52.00
Structural & plate, 2 ft.	51.00-52.00
Unstripped motor blocks	39.00-40.00
Charging box cast	32.00-33.00
No. 1 wheels	39.00-40.00

Railroad Scrap

No. 1 R.R. heavy melt.	49.00-50.00
Rails, 18-in. and under	63.00-64.00
Rails, rerolling	62.00-63.00
Rails, random lengths	58.00-59.00
Angles, splice bars	57.00-58.00

PHILADELPHIA

No. 1 heavy melting	*50.00-51.00*
No. 2 heavy melting	*43.00-44.00*
No. 1 bundles	*50.00-51.00*
No. 2 bundles	*40.00-42.00*
No. 1 busheling	*50.00-51.00*
Electric furnace bundles	*52.00-53.00†*
Mixed borings, turnings	36.50
Machine shop turnings	*36.00*
Short shovel turnings	39.00
Heavy turnings	*46.00-47.00*
Structurals & plate	*54.00-56.00*
Couplers, springs, wheels	59.00
Rail crops, 2 ft & under	64.00-65.00†

Cast Iron Grades

No. 1 cupola	50.00
Malleable	68.00
Heavy breakable cast	*53.00*
Drop broken machinery	*54.00-55.00*

†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*41.00-42.00*
No. 2 heavy melting	*37.00-38.00*
No. 1 bundles	*41.00-42.00*
No. 2 bundles	*32.00-33.00*
Machine shop turnings	*24.00-25.00*
Mixed borings, turnings	*27.00-28.00*
Short shovel turnings	*29.00-30.00*
Low phos. (structural & plate)	*45.00-46.00†*

Cast Iron Grades

No. 1 cupola	43.00-44.00
Unstripped motor blocks	30.00-32.00
Heavy breakable	45.00-46.00

Stainless Steel

18-8 sheets, clips solids	320.00-325.00
18-8 borings, turnings	150.00-160.00
430 sheets, clips, solids	120.00-125.00
410 sheets, clips, solids	100.00-105.00

†Nominal

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*38.00-39.00*
No. 2 heavy melting	32.00-33.00
No. 1 bundles	*38.00-39.00*
No. 2 bundles	*30.00-31.00*
Machine shop turnings	*23.00-23.50*
Mixed borings, turnings	*26.00-26.50*
Short shovel turnings	*27.00-28.00*
No. 1 cast	*40.50-41.00*
Mixed cupola cast	*38.00-39.00*
No. 1 machinery cast	*42.00-43.00*

BUFFALO

No. 1 heavy melting	46.00-47.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	46.00-47.00
No. 2 bundles	37.00-38.00
No. 1 busheling	46.00-47.00
Mixed borings, turnings	29.00-30.00
Machine shop turnings	28.00-29.00
Short shovel turnings	30.00-31.00
Cast iron borings	30.00-31.00
Low phos.	46.00-47.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	46.00-47.00
No. 1 machinery	49.00-50.00

Railroad Scrap

Rails, random lengths	60.00-61.00
Rails, 3 ft and under	62.00-63.00
Railroad specialties	54.00-55.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	45.00-46.00
No. 2 heavy melting	*36.00-37.00*
No. 1 bundles	45.00-46.00
No. 2 bundles	*34.00-35.00*
No. 1 busheling	45.00-46.00
Machine shop turnings	*29.50-30.50*
Mixed borings, turnings	*30.00-31.00*
Short shovel turnings	*31.50-32.50*
Cast iron borings	*30.00-31.00*
Low phos., 18 in.	54.00-55.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Heavy breakable cast	42.00-43.00
Charging box cast	42.00-43.00
Drop broken machinery	54.00-55.00

Railroad Scrap

No. 1 R.R. heavy melt.	51.00-52.00
Rails, 18 in. and under	*65.00-66.00*
Rails, random lengths	*58.00-59.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	40.50
No. 2 heavy melting	37.00
No. 1 bundles	40.50
No. 2 bundles	32.00
No. 1 busheling	40.50
Machine shop turnings	*26.00*
Short shovel turnings	*26.00*

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	40.00
Heavy breakable cast	38.00
Unstripped motor blocks	38.00
Brake shoes	43.00
Clean auto cast	48.00
Stove plate	41.00

Railroad Scrap

No. 1 R.R. heavy melt.	50.50
Rails, 18 in. and under	66.00
Rails, random lengths	60.00
Rails, rerolling	66.00
Angles, splice bars	54.00

SEATTLE

No. 1 heavy melting	42.00
No. 2 heavy melting	38.00
No. 1 bundles	34.00
No. 2 bundles	32.00
No. 3 bundles	25.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings	15.00-16.00
Electric furnace, bundles	55.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	40.00-43.00
Heavy breakable cast	38.00
No. 1 wheels	35.00
Unstripped motor blocks	33.00
Clean motor blocks	40.00
Stove plate (f.o.b. plant)	35.00
Brake shoes	35.00

Railroad Scrap

Rails, random lengths	33.00

LOS ANGELES

No. 1 heavy melting	42.00
No. 2 heavy melting	38.00
No. 1 bundles	41.00
No. 2 bundles	33.00
Machine shop turnings	20.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	48.00

SAN FRANCISCO

No. 1 heavy melting	40.00
No. 2 heavy melting	35.00
No. 1 bundles	39.00
No. 2 bundles	32.00
No. 1 busheling	40.00
Machine shop turnings	23.00
Mixed borings, turnings	23.00
Cast iron borings	23.00
Short shovel turnings	25.00
Cut structurals	49.00
Heavy turnings	23.00
Punchings & Plate scrap	44.00

Cast Iron Grades

No. 1 cupola	50.00
Charging box cast	35.00
Stove plate	39.00
Heavy breakable cast	36.00
Unstripped motor blocks	32.00
Brake shoes	35.00
Clean auto cast	50.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	50.00

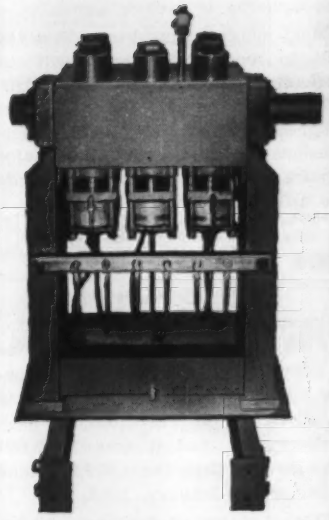
HAMILTON, ONT.

No. 1 heavy melting	45.50
No. 2 heavy melting	41.50
No. 1 bundles	45.50
No. 2 bundles	38.00
Mixed steel scrap	38.00
Mixed borings, turnings	19.00
Rails, remelting	54.50
Busheling, new factory: Prepared	43.50
Unprepared	39.50
Short steel turnings	27.50

Cast Iron Grades†

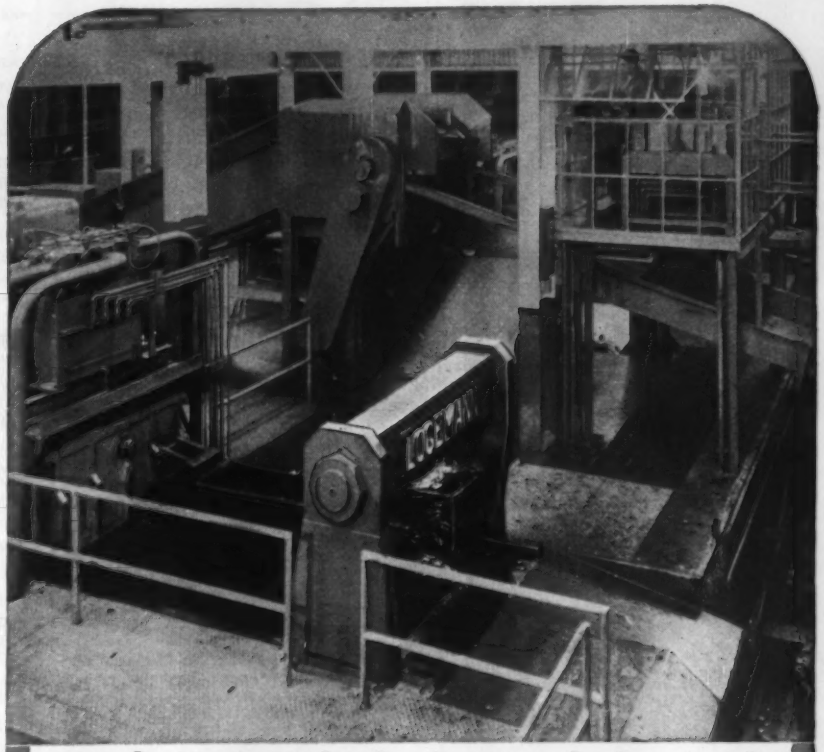
No. 1 machinery cast	42.00-45.00

†F.o.b., shipping point.



LOGEMANN HYDRAULIC OPERATING VALVE

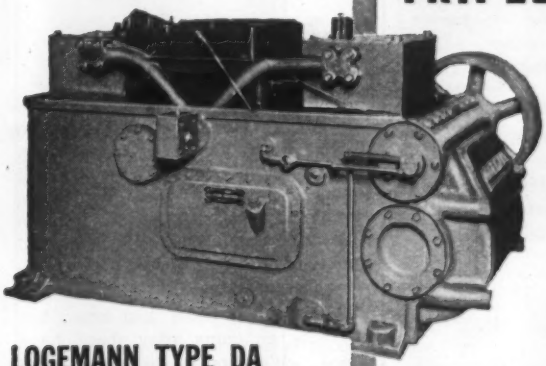
This compact valve was designed to control the movements of the hydraulic rams in large scrap presses but can be modified to suit similar operations on other hydraulic equipment. Interested parties will please outline the nature of the service, operating sequence, gallonage and pressure requirements.



Get low cost, high density bales with LOGEMANN SELF-CONTAINED TRIPLE-COMPRESSION PRESSES

The illustration shows one of two large scrap-press units in a modern automotive plant. Over a period of many years, such units have baled sheet scrap skeletons and trim from metal operations in large industrial plants throughout the country, forming the scrap into high-density bales for re-melting in steel mills. Low baling costs are the result of correct design for heavy duty service, minimum maintenance and operating interruptions, as well as simplicity, accessibility and safety features.

Pioneers in the metal baling field, LOGEMANN engineers embodied in the design those features that have proven dependable over an extended period of years. Some installations in service over 35 years are still operating economically.



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These compact and efficient opposed-cylinder reciprocating-plunger pumps for low and high pressure service lend themselves to a wide range of double pressure applications. They are close-coupled, reliable, and capable of delivering high gallonage, at low and high pressures, at low power costs.

Tell Us the nature of your scrap!

LOGEMANN press sizes are not confined to the large models. Producers of sheet scrap—steel, copper, brass, or aluminum—are invited to submit their scrap baling problems regardless of tonnage. Please state the character of the metal, minimum tonnage to be handled in a given period of hours, range of gauges and, where possible, indicate maximum and minimum lengths and widths of pieces. Experienced sales engineers are available for discussion of your conditions and requirements.

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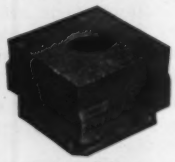

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CHICAGO 4 HOUSTON 2 LOS ANGELES 3

(*Concluded from page* 177)

St. Louis—The scrap market continues in the doldrums. Mills are getting in more tonnage than they need, and their ground storage is loaded almost to capacity. Inspection and grading are rigid. Railroad scrap fell last week, showing a tendency to go back to normal differentials.

Birmingham — The scrap market is quiet. Open-hearth steel purchases are at a standstill with the area's largest buyer out of the market and holding up deliveries. Some activity is noted in electric furnace grades. Bundles were bought at $2 per ton under recently prevailing prices. Specialties appear a little stronger. The same is true of cast grades. Dealers are receiving fair tonnages. The export market is a little easier.

Los Angeles—Prices are unsteady. Increased quantities of offshore scrap are a disturbing factor.

San Francisco—Prices appear to be stabilized at the lower levels recently established. There are ample supplies and area mills are restricting their intake of material somewhat.

Seattle—Scrap has settled on the basis of $42 and $38, respectively, for No. 1 and No. 2 heavy melting steel. Domestic consumption is heavy but receipts have dropped since the Feb. 1 price decline, partly because of adverse weather. Japanese buyers have withdrawn from the market to some extent, also. Ship chartering for the movement of scrap to Japan is active, however. It is estimated that on the basis of record high charter rates the delivered price of scrap exported to Japan is $70 or more per ton.

Pig Iron . . .

Pig Iron Prices, Page 165

Blast furnace production of pig iron and ferroalloys during January was the largest for any month on record, reports the American Iron & Steel Institute. Total output was 7,049,564 net tons, of which 6,985,945 tons were pig iron. In January, 1955, total output was 5,745,564 tons.

In attempting to anticipate what action the Interstate Commerce Commission might take on Feb. 25, pig iron consumers accumulated a little extra stock as a hedge against a rate increase.

Consumption continues brisk and is expected to maintain a steady rate for the next few weeks. The next sharp upturn in pig iron demand is likely to come when consumers decide that increases in pig iron prices are in the offing, and some protective covering is deemed advisable.

Most merchant pig iron sellers are able to meet requirements without difficulty. Some operational difficulties are noted. As the year progresses, there likely will be suspensions for relining and other major repairs to blast furnaces. Some units are already overdue.

Iron Ore . . .

Iron Ore Prices, Page 173

Consumption of Lake Superior iron ore totaled 7,952,689 gross tons in January, reports the Lake Superior Iron Ore Association. This was up sharply from the 7,663,033 used in December, and it was 1,332,869 tons greater than the 6,619,820 tons consumed in January, 1955.

Stocks of ore at furnaces and on docks on Feb. 1 were 36,701,847 tons. This compares with 44,359,011 on Jan. 1, and with 37,470,406 on Feb. 1, last year.

Active on Feb. 1 were 194 blast furnaces. This compares with 192 on Jan. 1, and with 167 on Feb. 1 a year ago. Only 11 blast furnaces dependent on Lake Superior ore are on the inactive list, eight in this country and three in Canada. A year ago there were 38.

Warehouse . . .

Warehouse Prices, Page 165

Distributors have had little opportunity to round out their stocks in the most popular items (plate, structural shapes and hot-rolled sheet). Mills are adhering more closely to delivery promises than in a considerable time, however, and tonnage is coming through in somewhat better volume.

Cold-finished sheet and some bar products, including alloy bars, have eased. Warehouses are improving their service in those lines.

Heavy sales this quarter are due to improved availability of sheet and to the terrific demand for plate and shapes from construction firms and equipment makers. Turnover would be larger if distributors' stocks were better balanced.

Normal warehouse business continues to be augmented by demand from consumers who have been unable to fill their needs satisfactorily at usual mill sources.

Adjustments are still being made in warehouse price schedules to bring quotations in line with revised mill extras.

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A national multi-plant organization requires an experienced Welding Engineer and Metallurgist to have complete responsibility for welding design and practice. Fabrication of code vessels of carbon and stainless steels, aluminum and copper base materials. College plus 8 or more years' experience. High salary plus profit sharing.

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Headquarter in Pittsburgh or Chicago to supervise installation of refractories, also to demonstrate and instruct in the application of special materials.
Knowledge of steel producing furnaces important.
Practical experience in industry with mechanical ability required. Should have at least partial college education in Engineering or equivalent.
Single, between ages of 24 to 29 preferred as position will involve considerable travel. Persons hired will become the basis of a new department in major expanding company. Salary proportionate with ability.
Give full details of education, experience and availability, also include photograph.

Reply Box 384, STEEL,

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For QUALITY CONTROL ENGINEERS with training or experience in the field of process analysis and statistical analysis.

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We may have the opening you are looking for to provide you with the opportunity to fully utilize your capacity and meet your needs in an expanding progressive organization.

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Positions Wanted

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After six years' technical sales experience with manufacturers agent is interested in companies seeking representation in Northern Ohio. Reply Box 383, STEEL, Penton Bldg., Cleveland 13, Ohio.

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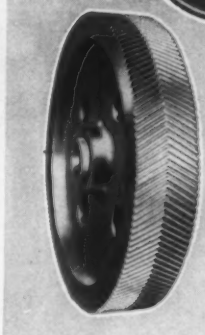
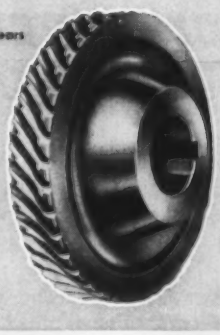
built for LONG, TOUGH service

PHILLIE GEAR



Continuous tooth Herringbone Gears

Spiral Bevel Gears



Worm Gears

PHILADELPHIA GEAR WORKS INCORPORATED

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

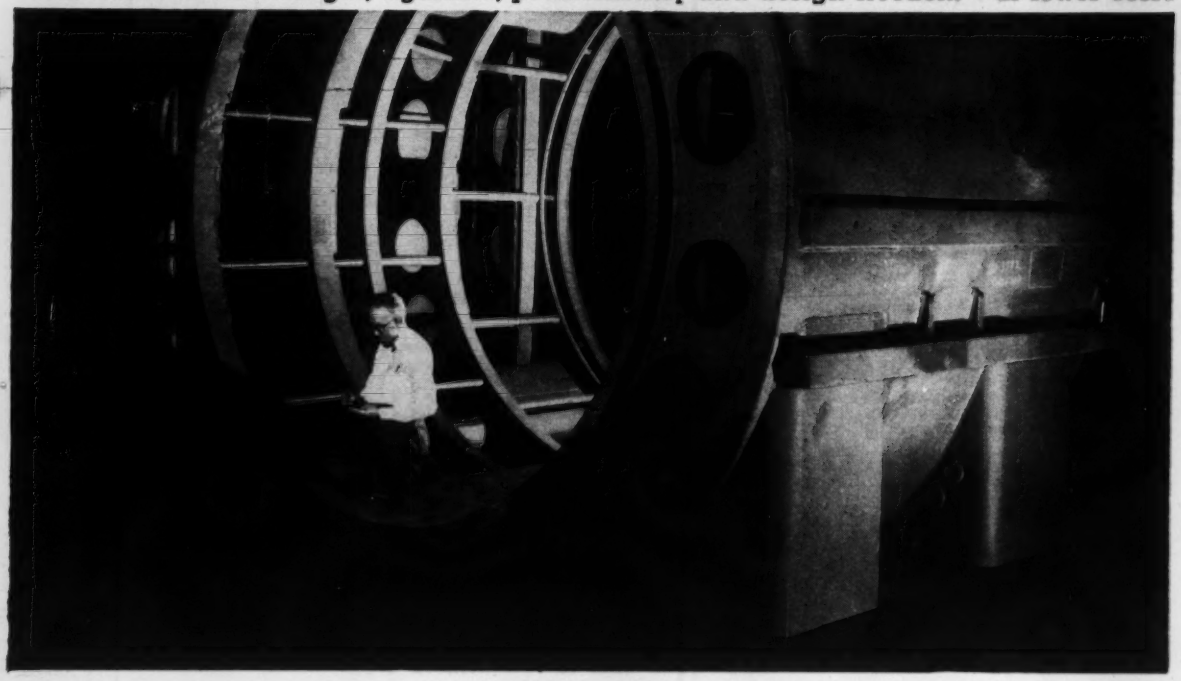
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
BALTIMORE • CLEVELAND

Virginia Gear & Machine Corp., Lynchburg, Va.

Industrial Gears & Speed Reducers • LimiTorque Valve Controls

Established 1892

WELDMENTS for strength, lightness, predictability and design freedom—at lower cost!



ELECTRICAL GENERATOR FRAME: End section of a three-piece stator frame built by Lukenweld for General Electric. This type of welded structure provides remarkable rigidity and strength at critical points with a minimum of weight.

LUKENWELD QUALITY WELDMENTS OFFER YOU A UNIQUE COMBINATION OF ADVANTAGES

Lukenweld welcomes orders for the really big and challenging weldments. The most extensive facilities and longest experience of any commercial weldery in the country combine to save you money and time. Here's how...

DEPENDABILITY The predictability and rigidity of welded structures plus Lukenweld's specialized knowledge of design and materials selection assures equipment that will perform efficiently, longer.

RELIABLE SOURCE OF MATERIALS Carbon, alloy and clad steel plates in the widest range of types and sizes available anywhere are obtainable "right next door"—from the Lukens rolling mills.

CONSULTATION SERVICE Metallurgical, design engineering, related services are available on your job.

FINISHING FACILITIES Modern heat treating, machining and other finishing facilities are your assurance of complete quality control from steel plate to finished weldment—ready for assembly in your equipment.

EXPERIENCE Lukenweld, the first commercial weldery in the U.S., pioneered many advances in welded construction. Knowledge and craftsmanship gained through this experience make Lukenweld unusually qualified to meet your weldment needs.

FOR INFORMATION on how Lukenweld can answer your particular weldment problems or for a copy of the informative booklet, "Weldments by Lukenweld," write on your company letterhead to Manager, Marketing Service, 819 Lukens Building, Coatesville, Pa.

LUKENWELD LUKENS

A DIVISION OF LUKENS STEEL COMPANY
COATESVILLE, PENNSYLVANIA

Our customers are talking!

They list 10 big reasons why Lee Wilson Single-Stack Furnaces have become the industry's favorite

1 **GREATER FLEXIBILITY** — Only one pedestal to be loaded to complete a charge.

2 **MORE UNIFORM HEAT APPLICATION**—Charge surrounded by a complete circle of "O" tubes—each stack has its own control.

3 **IMPROVED CUSTOMER SERVICE** — Cold mill to shipping dock in 5 days.

4 **HIGHER PRODUCTION**—Each stack has 5 million BTU maximum input per hr., with convection system to distribute this input. Heats faster—cools faster.

5 **BETTER LOAD FACTOR** — Average load on single stack base—85% of maximum.

6 **MINIMUM PROCESS INVENTORY**—50% of former tonnage in annealing department.

7 **REDUCED LABOR COST**—In large tonnage single stack installation, annealed tons per man hour reach a figure of 10, not attained by any other type of equipment.

8 **BETTER OPERATING CONDITIONS**—Open base arrangement with forced cooler is cleaner, cooler and easier to operate.

9 **LOWER MAINTENANCE COST**—Approximately half the number of radiant tubes and fan motors for given tonnage. Less inner cover replacement.

10 **REDUCED INSTALLATION COSTS** —
(a) Costly full basement and understructures eliminated.
(b) Lighter cranes and buildings can be used — furnace weight — 15 tons — coil weight determines crane capacity.
(c) Less overall building space required for given tonnage.

9929

Lee Wilson * ENGINEERING COMPANY, INC.

20005 WEST LAKE ROAD • CLEVELAND 16, OHIO

SINGLE-STACK RADIANT TUBE ANNEALING FURNACES

MAKE THE BEST METALS BETTER

* ORIGINATORS AND LEADING PRODUCERS OF SINGLE-STACK RADIANT TUBE FURNACES

Tumbles 1050 lbs. of castings in abrasive stream–TIMKEN® bearings hold drum rigid to guarantee tight seal

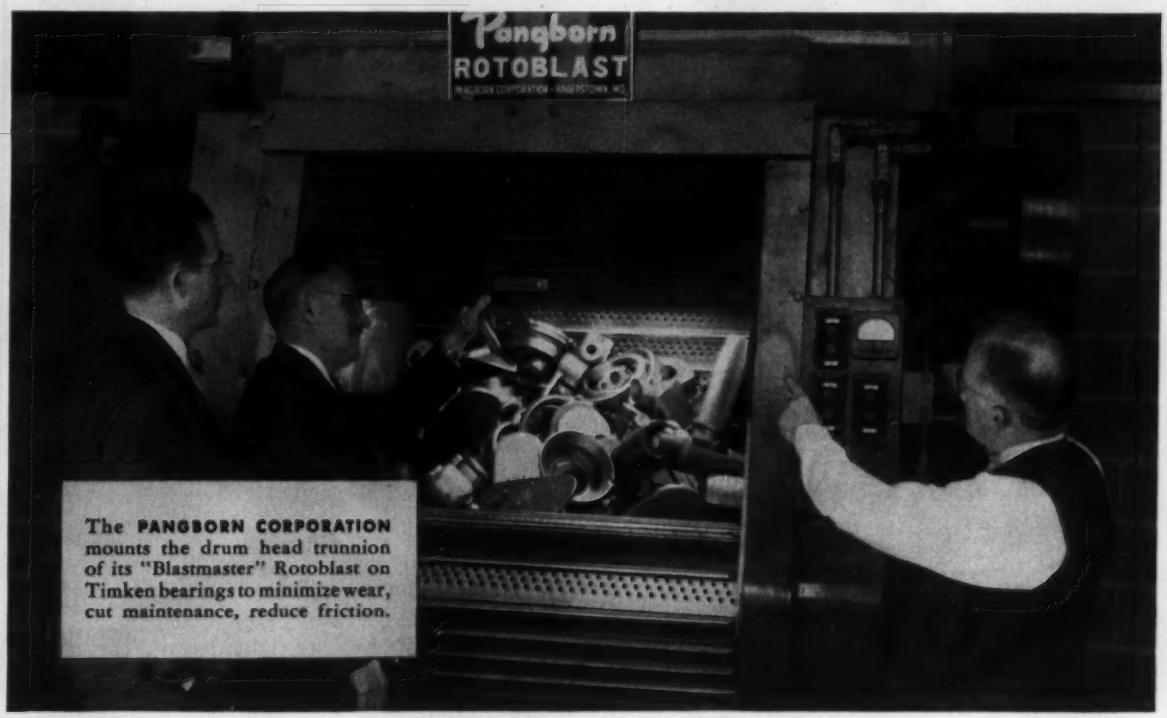
IT'S the job of the "Blastmaster" to clean heavy castings and forgings by tumbling them in a high-velocity stream of abrasive. Of course, it's important that the flying abrasive be sealed in the barrel. The answer: mount the drum head trunnions on Timken® bearings. Their tapered construction lets them take both radial and thrust loads, holding drum ends and work conveyor in rigid alignment. As a result, a tight running seal can be maintained, tiny particles of flying abrasive are kept inside the drum.

On larger Pangborn machines, these Timken bearings handle payloads of up to 4700 lbs. of tumbling castings with ease. That's because full line contact between rollers and races gives Timken bearings extra load-carrying capacity. Rollers and races are case-hardened—have hard, wear-resistant surfaces over tough, shock-resistant cores. They easily take the shock loads from tumbling forgings.

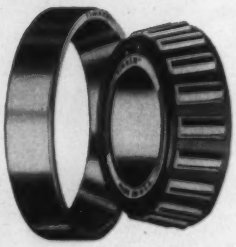
Wear is held to a minimum because Timken bearings practically eliminate friction. That's because they're designed to roll true; and because they're made with microscopic accuracy to conform to their design. And you're doubly assured of Timken bearings' quality, because we make our own steel. No other U. S. bearing maker does.

So always specify bearings stamped with the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



The **PANGBORN CORPORATION** mounts the drum head trunnion of its "Blastmaster" Rotoblast on Timken bearings to minimize wear, cut maintenance, reduce friction.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

IT'S TIMKEN BEARINGS FOR VALUE!

To get the best value in bearings you may find this simple formula helpful:

$$Value = \frac{quality + service + public\ acceptance}{price}$$

Obviously a big advantage *above* the line gives you more value than a small one *below*. No other bearing can match the uniform high quality, engineering and field service and overwhelming public acceptance you get with Timken bearings.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◐ AND THRUST —◐— LOADS OR ANY COMBINATION —✳—